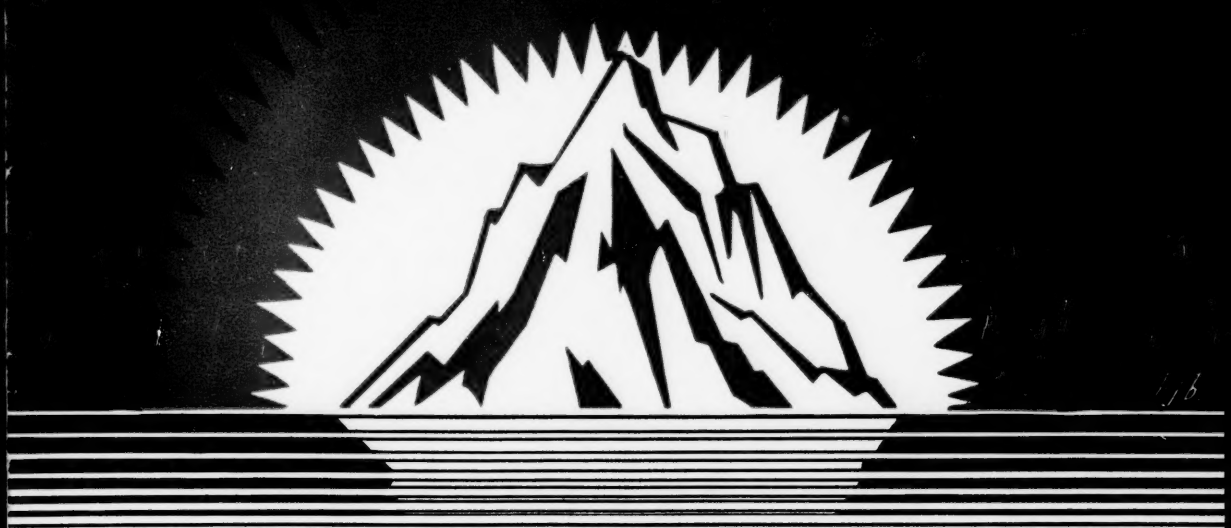
ICE AND Refrigeration



PUBLISHED BY NICKERSON & COLLINS CO., CHICAGO - NEW YORK

58th YEAR ★ APRIL, 1949

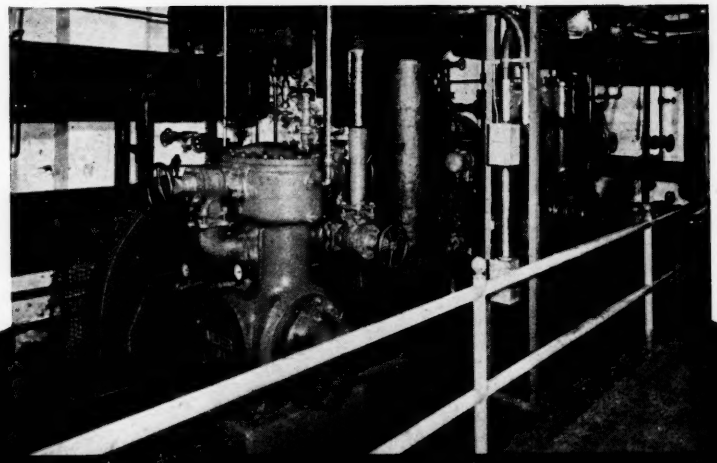


Photo courtesy Vilter Mfg. Co.

REFRIGERATE AT LOWER COST

Keep compressors clean by lubricating with Texaco Capella Oils

LUBRICATE your refrigerating compressors with *Texaco Capella Oils*, and they'll operate more efficiently, require less servicing, produce more refrigeration for every dollar you spend.

Texaco Capella Oils are highly refined lubricants that are moisture-free, have low pour tests, and do not react with refrigerants. They are free of impurities that form harmful carbon, gum and sludge, so compressors and coils stay *clean* . . . assuring lower maintenance costs – higher refrigeration output.

Texaco Capella Oils come in a wide range of viscosities to assure maximum efficiency from compressors of every type and size. A Texaco Lubrication Engineer will gladly help you select the best oil for your particular operation.

Call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

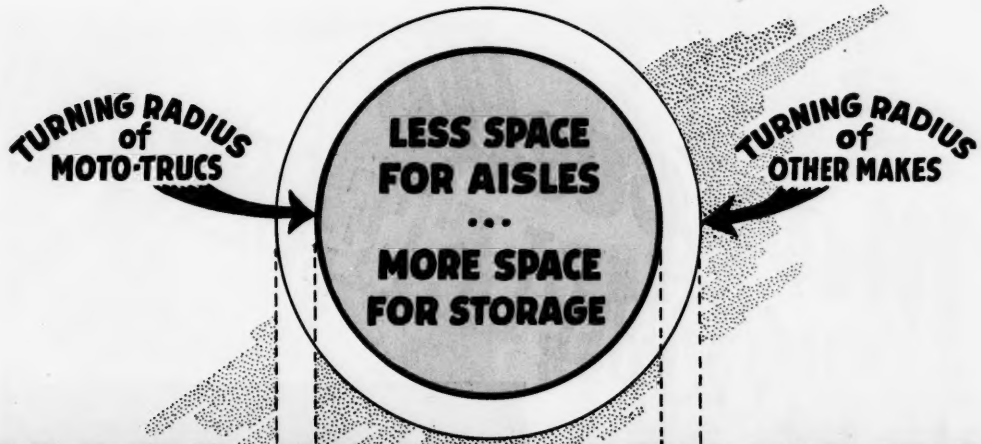
TEXACO Capella Oils

FOR ALL AIR CONDITIONING AND REFRIGERATING EQUIPMENT

TEXACO

Tune in . . . TEXACO STAR THEATRE every Wednesday night starring Milton Berle. See newspaper for time and station

ICE AND REFRIGERATION, Nickerson & Collins Co., Publishers, 433-435 N. Waller Ave., Chicago 44, Ill. Published monthly, Vol. 116, No. 4, April, 1949. Entered as second-class matter August 8, 1891, Chicago, Ill., under the Act of March 3, 1879. Additional entry at Beloit, Wis., April 20, 1948. Copyright 1949. Subscription in the U. S. $3.00 per year; other countries $4.00.

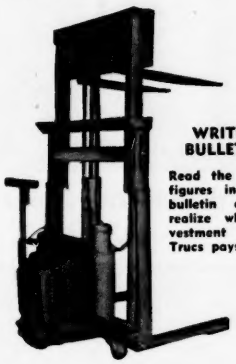


MOTO-TRUCS ARE UP TO 15" SHORTER

and have EASIEST CONTROL!

TELESCOPIC HI-LIFT TRUCK

Capacity: 4,000 lbs., Lift 60".
Capacity: 3,000 lbs., Lift 80".
Capacity: 2,000 lbs., Lift above 80" up to 120".
Collapsed Height: 66" to 80".



WRITE FOR BULLETIN 49

Read the facts and figures in this new bulletin and you'll realize why an investment in Moto-Trucs pays off.

Unequalled maneuverability in small spaces is but one of the many reasons why materials handling engineers choose the Moto-Truc as the leading motorized hand truck on the market.

The Moto-Truc operates in a 6' aisle with a 36"x48" pallet.

Moto-Truc Safety is another important factor. Dead man controls and other safety features give the operator confidence in his protection.

Moto-Trucs are the easiest to inspect and service. The entire motor unit can be replaced in from 15 to 30 minutes.

Motor unit and body are ruggedly constructed for long service. And after years of service the truck can be rebuilt, adding improved features, at surprisingly low cost.

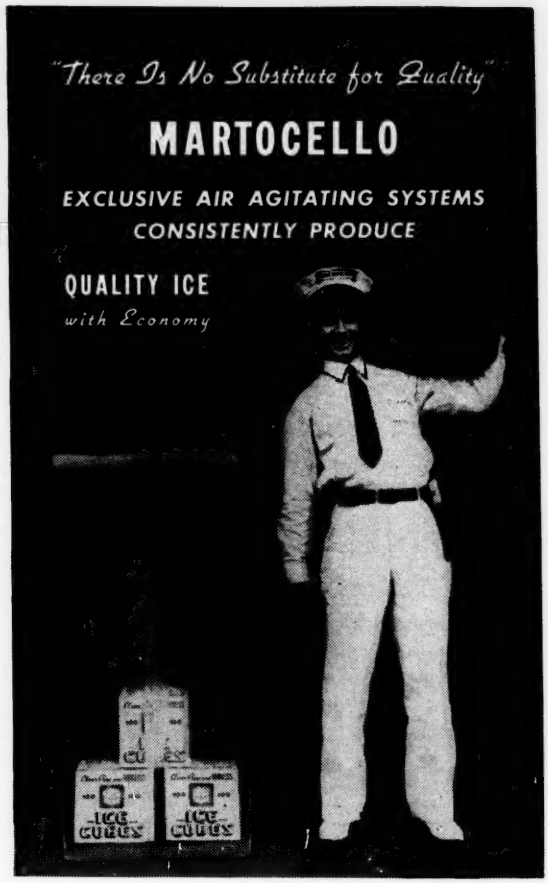
Martocello offers a COMPLETE SERVICE

MARTOCELLO Complete Line of ICE MAKING EQUIPMENT and SUPPLIES

gives OPERATION ECONOMY

with IMPROVED QUALITY

and INCREASED SALES



Compare Prices

LET US QUOTE YOU OR SEND YOUR ORDERS IN NOW. COMPARE QUALITY AND PRICE AND SEE WHY MARTOCELLO WINS OUT EVERY TIME.

Jos. A. Martocello & Co. — NOTHING BUT THE BEST — 229-231 NORTH 13th STREET PHILADELPHIA 7, PA.

"Serving the Ice Industry Since 1916". . "There is no Substitute for **MARTOCELLO QUALITY"**

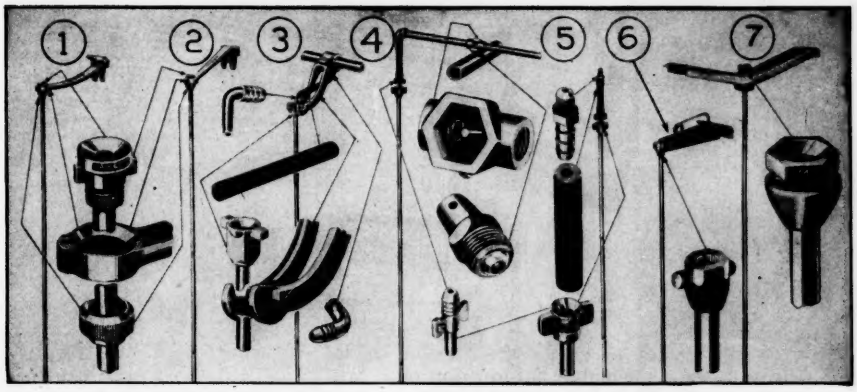
TIME

to

CHECK YOUR REQUIREMENTS

MARTOCELLO *"CHECKS"* ON EVERY POINT

✓ *phone, write or wire* ✓ *prompt shipments* ✓ *attractive prices*



THE ILLUSTRATION ABOVE SHOWS THE FOLLOWING CLEAR ICE MAKING SYSTEMS

1. MARTOCELLO SELF-CENTERING DROP TUBE BRACKET, Offset Form
2. MARTOCELLO SELF-CENTERING DROP TUBE BRACKET, Straight Form
3. MARTOCELLO SERIES DROP TUBE BRACKET
4. DOUBLE BRACKET SYSTEM ASSEMBLY
5. SERIES DROP TUBE ASSEMBLY
6. GALVANIZED STEEL TRUNNION TYPE BRACKET ASSEMBLY
7. GALVANIZED STEEL SADDLE BRACKET ASSEMBLY

Everything for the Ice Industry

Jos. A. Martocello & Co. — KNOWING BUT THE BEST — 229-231 NORTH 13th STREET PHILADELPHIA 7, PA.

"Serving the Ice Industry Since 1916"..."There is no Substitute for MARTOCELLO QUALITY"

A NEW REFRIGERATION CONDENSERS BOOKLET BY Vogt

Write FOR BULLETIN RC-1

Here's pertinent, up-to-the-minute information on our complete line of refrigeration condensers . . . a 24 page booklet showing types and sizes designed to deliver low temperature liquid with the lowest condensing pressure.

Vogt Refrigeration Condensers are fabricated from top quality plates, tubes, pipes, forgings, and castings by skilled workmen in modernly equipped shops. Units are designed, tested and stamped to A.S.M.E. Code requirements.

Vogt FOR BETTER REFRIGERATION

HENRY VOGT MACHINE CO., LOUISVILLE 10, KY.

BRANCH OFFICES: NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO, ST. LOUIS, DALLAS

Now! the Most Powerful Sales Features of them all!

"Optional Conveniences"

... PLUS new shelves with "Feature Front" trim styling!

with the NEW

Vitalaire

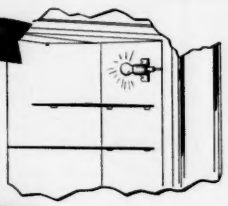
ICE REFRIGERATORS

Here is the sales ammunition you'll need for increased volume and profits in '49! Just think what Vitalaire's new "Optional Conveniences" mean to you; first, they mean a big edge over your usual competition; second, they give you sales points equal to anything your mechanical competition offers! And, remember—Vitalaires, now as always, are fully equipped steel refrigerators—complete to the last, *wanted* detail! See them, place your order *now* for PROMPT DELIVERY on all models!

INTERIOR LIGHTING

optional!

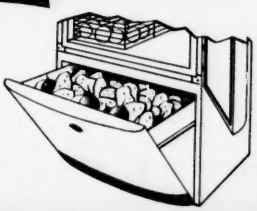
A brand new, grand view feature that makes a crowd-stopper of your Vitalaire display! Interior light operates automatically. Optional on Models VJ5 and VJ6 only.

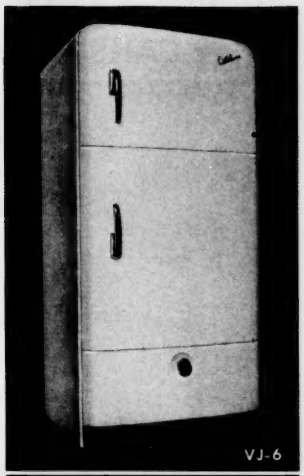


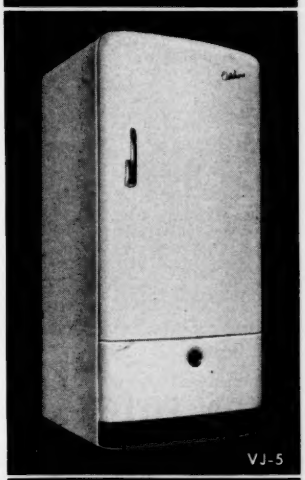
VEGETABLE BIN

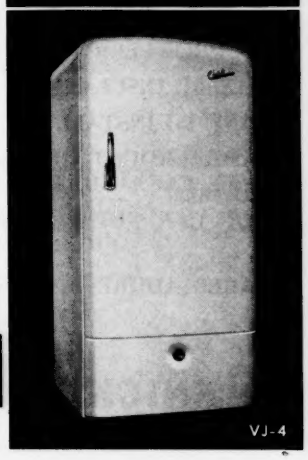
optional!

Another feature the housewife has been waiting for... now yours to offer with Vitalaire... the *complete* refrigerator! Vegetable bins are important necessities which will help increase your unit sale. Optional on Models VJ5 and VJ6.







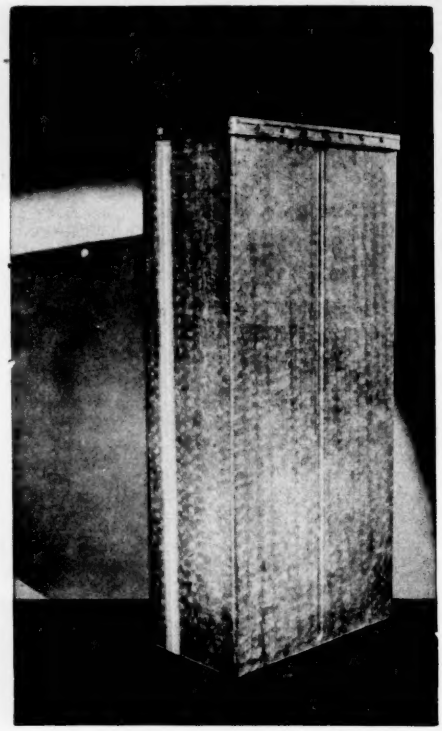


ICE COOLING APPLIANCE CORP.

PLANT AND SALES OFFICES: MORRISON, ILL.

PROMPT SHIPMENT!

ICE CANS



WELDED OR RIVETED
LARGE OR SMALL

FOR: LOW PRESSURE
HIGH PRESSURE
ARCTIC POWNALL PLANTS

ALSO

CORE FILLERS
CORE SUCKERS
BRINE TESTING KITS
FISH FREEZING PANS
FISH FREEZER TRUCKS

ASK FOR
PRICE & DELIVERY

"BUILT STRONGER TO LAST LONGER"

CAN FILLER →

BUILT TO FILL ONE OR MORE CANS

ASSURES CLEAN WATER

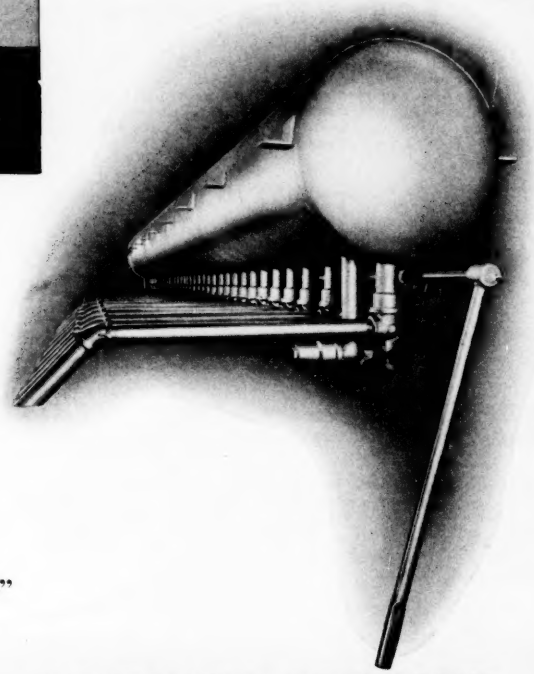
MAY BE INSULATED

EASY TO INSTALL

SAME AMOUNT OF WATER AT EACH FILLING

YOU CAN GET YOURS—NOW!

CABLE ADDRESS: "KNICKSTACO"



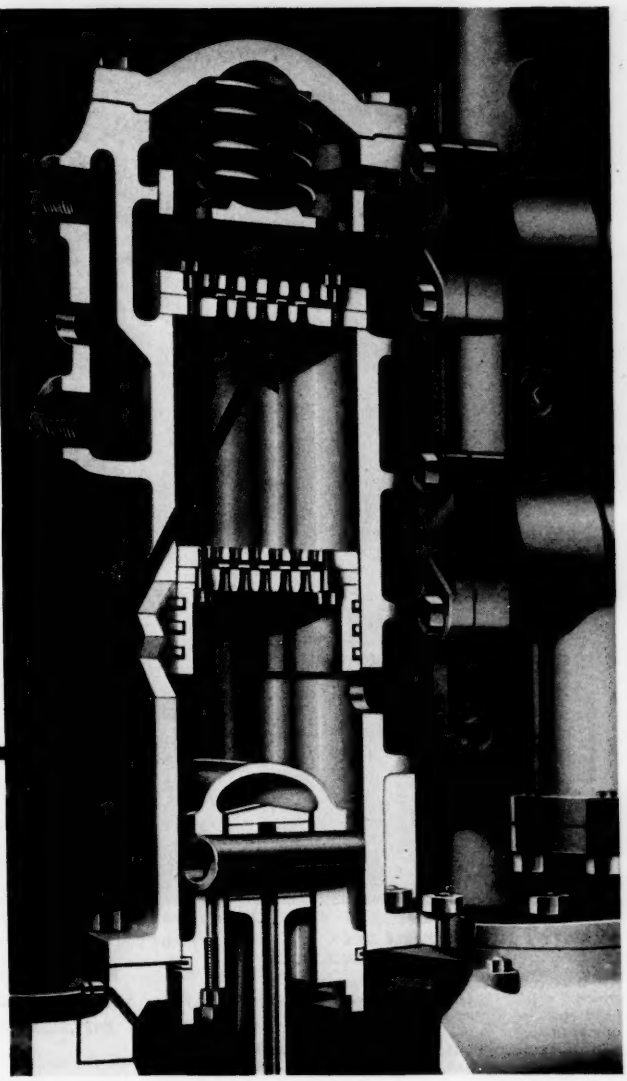
KNICKERBOCKER STAMPING COMPANY
PARKERSBURG, W. VA.

Inside Knowledge on Lubrication Problems

—VALVE DEPOSITS—

This is one of a Series of Messages on Common Problems in Your Plant

No Place for Deposits



THE EFFICIENCY of your ammonia compressor and, consequently, your entire refrigeration system, centers around this heat zone of the valves and pistons.

Here, if your lubricating oil deteriorates, you get gummy deposits that clog up the valves and may cause rings to stick. Moreover, some of these deposits will carry over into the condenser to interfere with rapid heat transfer.

To help you avoid this danger, Socony-Vacuum offers the special protection of Gargoyle Arctic Oils. These outstanding lubricants give you the high chemical stability necessary to resist deterioration and minimize deposits in your compressor and condenser. They form strong films to protect all the vital working parts, and they possess an unusually low pour point to flow freely from evaporator coils.

Keep your compressor—and your entire system—clean with these oils, and make certain of continuous, trouble-free operation.

SOCONY-VACUUM OIL CO., INC.
and Affiliates: Magnolia Petroleum Company
General Petroleum Corporation

GARGOYLE Lubricants

SOCONY-VACUUM

Socony-Vacuum Correct Lubrication

FOR EVERY MACHINE . . . EVERY OPERATING CONDITION

SPECIFICATIONS ON ICE STATION

ALL AIRCRAFT ALUMINUM CONSTRUCTION: Outside structure, .051 aluminum; dead air space; .032 Aircraft aluminum; permanently secured Fibre glass insulation; inside structure, .051 Aircraft aluminum. Vapor sealed throughout.

REFRIGERATOR DOOR: .051 Aircraft aluminum construction well insulated with batts of Fibre glass.

REFRIGERATION: 1½ H. P. condensing unit with banks of vacuum cold plate evaporators (more effective than coils). Guaranteed to maintain below freezing temperature with outside temperatures of 100°.

COIN MECHANISM: Lever operated, positive delivery, rejects slugs; also returns money when machine is empty.

PAT. PENDING

FRIGID-VEND AIRCRAFT ALUMINUM ICE STATION

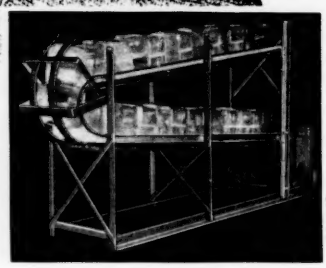
FIREPROOF

Vends Blocked Cubed and Sized Ice

The Frigid-Vend Ice Station is in a class by itself because of its all Aircraft aluminum construction. Lighter in weight, it comes to you already assembled and mounted on skids ready to slide onto foundation.

Vending mechanism is positive and fool-proof. Vending lever is clutch operated, preventing breakage of handle and damage to mechanism. A customer, after insertion of money, can receive only one unit of ice at a time. Jackpot operation is impossible. Coin mechanism rejects slugs and returns money when machine is empty. In appearance, and in profitable operation, a complete Frigid-Vend Ice Station is all you could ask for.

The Station will vend four kinds of ice, two sizes of blocked ice as well as cubes or crushed ice in bags or packages. Or if you prefer you can vend any smaller combination of these four types.



GRAVITY ACTION DOUBLE DECK ICE BLOCK VENDORS

All steel construction with stainless steel covered tracks. ½ H. P. motor with gear head operates tripper bars during vending operation.

Capacity: 25 lb. ice blocks model—27 or 54 blocks
50 lb. ice blocks model—19 or 38 blocks

FRIGID-VEND BAG, PACKAGE AND ICE BLOCK VENDORS CAN BE PURCHASED SEPARATELY FOR INSTALLATION IN ANY ICE STORAGE ROOM.

Before You Buy, Get All the Facts. Write for information. Prompt delivery on all Frigid-Vend Equipment.

THERMO CUBER

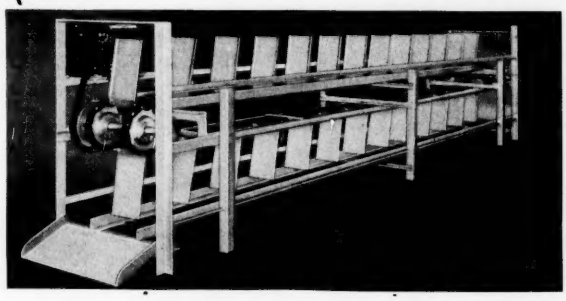
THERMO CUBER CO., INC. 2120-2124 N. SOUTHPORT AVE., CHICAGO 14, ILL.

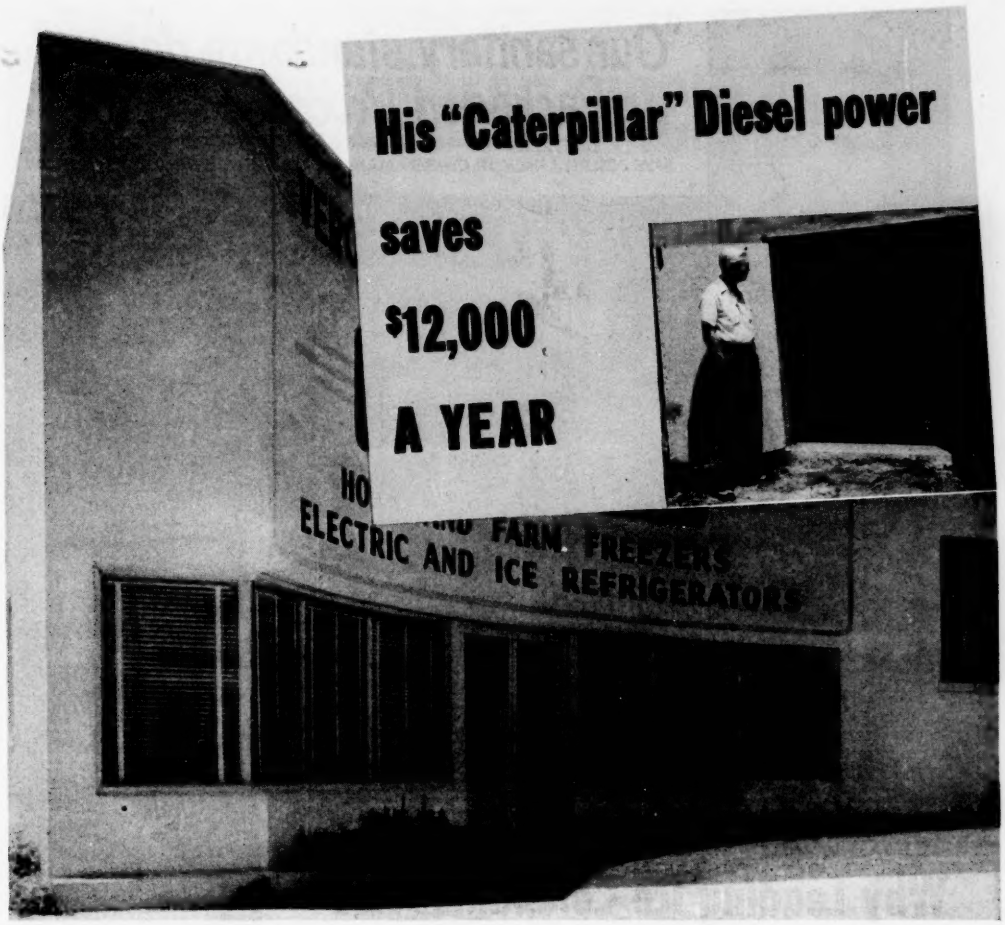
The NEW Frigid-Vend For Bagged Ice ➡

All steel construction. Double chain driven with ½ H.P. motor with gear head. Two and four deck models.

Capacity: TWO DECK VENDOR
25 to 36 bags or cartons depending on size of package.

Capacity: FOUR DECK VENDOR
54 to 78 bags or cartons depending on size of package.





J. S. Earman, President of the Vera Beach (Florida) Ice & Storage Co., estimates that through power savings, totaling $1000 a month, his four "Caterpillar" Diesels (two shown here) will practically pay for themselves in 18 months. Under average operating schedules, this is only a fraction of a "Cat" Diesel's "life expectancy" as based on the records of thousands of older installations throughout the world.

The four units—a D8800 and a D4400 Engine and two D315 Electric Sets—furnish power for ice making, ice storage, frozen food locker rooms, and lights. Various combinations of engine capacities permit varying the daily ice output from 10 to 60 tons. Therefore, no idling or needless power wastes. And no dead-loss stand-by charges.

Why don't you, too, "go 'Caterpillar'" and save money? You can get delivery sooner than you think. Consult your "Caterpillar" dealer. Meantime, use the coupon to send for literature.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR
REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

CATERPILLAR TRACTOR CO., Peoria, Ill.
Send price information and literature on "Caterpillar" Diesel power for ice and refrigeration. IR-4

Name_____

Address_____

"Our sanitary standards demand Packaged Processed Ice"

SAYS JOSEPH J. HACK, JR. OWNER-MANAGER, WESTLEIGH INN, LITCHFIELD, CONN.

The Westleigh Inn is one of the top-flight inns of New England. And the village of Litchfield, ten miles from the nearest railroad station and 33 miles from Hartford, is a "storybook" New England village.

Why Leading Ice Companies Are Switching to One-Trip Ice Bags

IT'S EASIER to sell processed ice to big volume users such as restaurants and food markets when you pack it in one-trip paper bags that lock out dirt and contamination.

For sanitation is the Number 1 concern of all who sell food . . . so vital that some prefer to invest in expensive, ice-making equipment rather than take a chance with nonpackaged ice.

And think of the extra advantages for you! Consumers ice more often with convenient-sized, easy-to-handle Union Paper Ice Bags. They're easily carried, and so speed up handling on the platform, in loading and at the delivery point. And the double layer of Union wet-strength paper acts as an insulator to retard melting.

A revolutionary idea not so many months ago, Union Paper Ice Bags are now used by hundreds of ice companies. Write for further information and free samples.

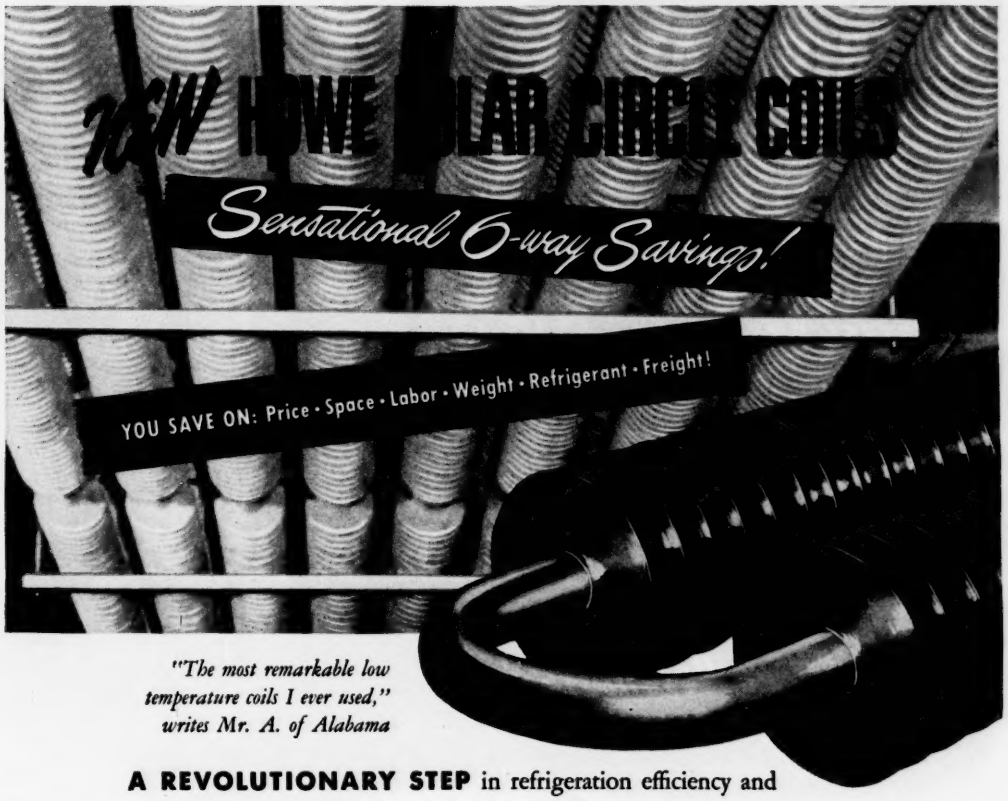
Wet-Strength Paper Ice Bags have tremendous strength even when soaking wet . . . thanks to a water repellent resin that binds the fibres of the paper firmly together.

ONE TRIP

UNION Paper Ice Bags

A product of the UNION BAG & PAPER CORPORATION • Woolworth Bldg., New York 7, N. Y.

Bags of Kraft, Transparent Films, Waxed Paper, Glassine, Laminates



"The most remarkable low temperature coils I ever used," writes Mr. A. of Alabama

A REVOLUTIONARY STEP in refrigeration efficiency and economy. Perfect for meat packers, quick freezing plants, cold storage plants, ice plants, ice cream plants. These amazing new HOWE POLAR CIRCLE COILS are built for heavy duty use in both coolers and freezers. Provide greatly improved refrigeration that assures better product control. Developed out of Howe's 37 years of specializing in refrigeration problems. *Proved* by on-the-job testing! Big Savings in all six ways over bare pipe coils!

IMMEDIATE DELIVERY—*WRITE FOR DETAILS*

***FOR ALL REFRIGERATION PROBLEMS** consult Howe, since 1912 manufacturers of ammonia compressors, condensers, coolers, fin coils, locker freezing units, air conditioning (cooling) equipment.*

AVAILABLE—A few territories for new Distributors. Your inquiry will receive our prompt answer.

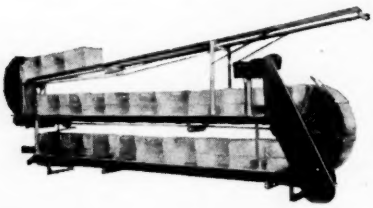
REFRIGERATED ICE VENDING STATIONS

ALUMINUM OR STEEL EXTERIORS

Completely Assembled Ready to "PLUG IN"

Strike it rich with automatic 24 hour ice service. Capture the plus sales of "after hour" business and the profitable market offered by the mechanical refrigerator owner. The experiences of scores of successful ice merchandisers show that volume in a territory increases following the installation of automatic ice vending machines . . . while costs decline. Cash in on the GREATER profits offered by automatic ice merchandising.

Seventeen years of experience devoted exclusively to the design and manufacture of automatic ice vending equipment stands behind every S & S STURDY-BUILT unit. Its efficiency, trouble-free operation, and low cost establishes it as the leader in the field. Compare them all, point for point. You'll buy S & S Sturdy-Built every time.



ICE VENDING MACHINES for installation in your own refrigerated storeroom for as little as $500.75. Automatic vending machines for 25 and 50 lb. blocks are available as are venders to handle packages of cubes or processed ice from 5 to 25 lbs.

Check these EXCLUSIVE FEATURES

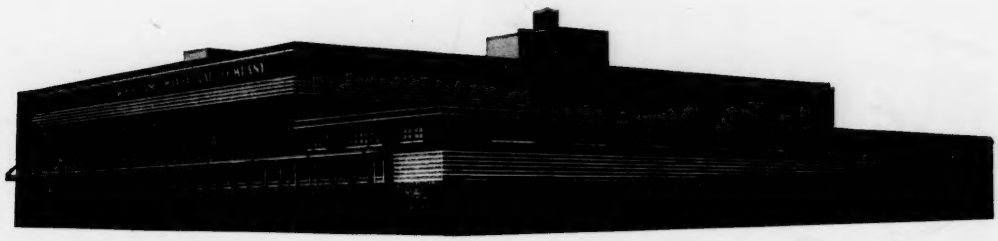
- All stations are equipped with time clocks that automatically turn lights off and on at the proper times.
- All stations are available with either steel or aluminum clad exteriors.
- All stations have time-tested trouble-free coin mechanisms.
- All vending machines are equipped with counting devices to check unit sales against money deposited.
- All vending machines are completely assembled when they leave the factory . . . ready to install in your refrigerated storeroom.

REFRIGERATED STURDY-BUILT ICE VENDING STATIONS

F. B. DICKINSON & CO.
Highland Park Station
Des Moines, Iowa

S&S ICE VENDING MACHINES

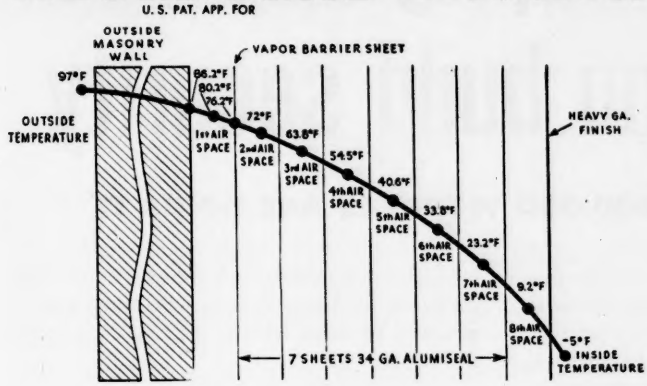
S & S VENDING MACHINE CO.
670 Lincoln Avenue
San Jose, California



Prominent Refrigerated Warehouse Protected With

ALUMISEAL *Insulation*...

U. S. PAT. APP. FOR



IT WAS A TORRID 97°F. OUTSIDE—

INSIDE, A FRIGID 5°F. BELOW ZERO

CROSS SECTION THROUGH SOUTH WALL, QUINCY MARKET COLD STORAGE & WAREHOUSE COMPANY, WATERTOWN, MASS., SHOWING ACTUAL TEMPERATURES RECORDED BETWEEN ALUMISEAL SHEETS.

Thermo-couples, permanently located in the wall, roof and floor construction, provide recordings for an hourly and daily log of conditions as they ACTUALLY exist through the Alumiseal construction. Shown above are the temperature recordings on August 29, 1948, the hottest day of the summer. Note that the surface temperature of the Alumiseal Vapor-Barrier Sheet, within 4°F. of the air in contact with the vapor barrier, means no condensation—actually dry walls.

This is the kind of proof—factual data from continued satisfactory use in the field—on which the many users of Alumiseal Insulation, such as those listed at right, are basing their selection for coolers, freezers, test rooms, and all other types of refrigerated structures.

Typical Organizations Using ALUMISEAL

CHELSEA WAREHOUSES, INC.
FIRST NATIONAL STORES
GENERAL ELECTRIC COMPANY
GENERAL FOODS
HATHAWAY BAKERIES
JOHN HANCOCK MUTUAL LIFE INSURANCE CO.
L. A. DREYFUS COMPANY
LOFT CANDY COMPANY
MANHATTAN REFRIGERATION CO.
MERCHANTS REFRIGERATION CO.
NATIONAL DAIRY PRODUCTS CO., INC.
NATIONAL TEA COMPANY
QUINCY MARKET COLD STORAGE & WHSE. CO.
SOUTHERN DAIRIES, INC.
STANDARD BRANDS, INC.
STANDARD OIL DEVELOPMENT CO.
U. S. ARMY AIR FORCE
U. S. ARMY ORDNANCE
U. S. NAVY

Write for full report on temperatures through Alumiseal Construction.

C. T. HOGAN and company, inc.

383 Madison Avenue
New York 17, N. Y.

Over a decade of experience in reflective insulation

SEALS OUT MOISTURE
...SEALS OUT HEAT!

U. S. PAT. APP. FOR

C. T. Hogan & Company, Inc. ★
383 Madison Avenue
New York 17, N. Y.

Gentlemen:

We would like complete information by mail____

We would like to have a representative call____

NAME_____

ADDRESS_____

_____

Your employees want to help you build security

HERE'S HOW 7,500,000 WORKERS ARE DOING IT

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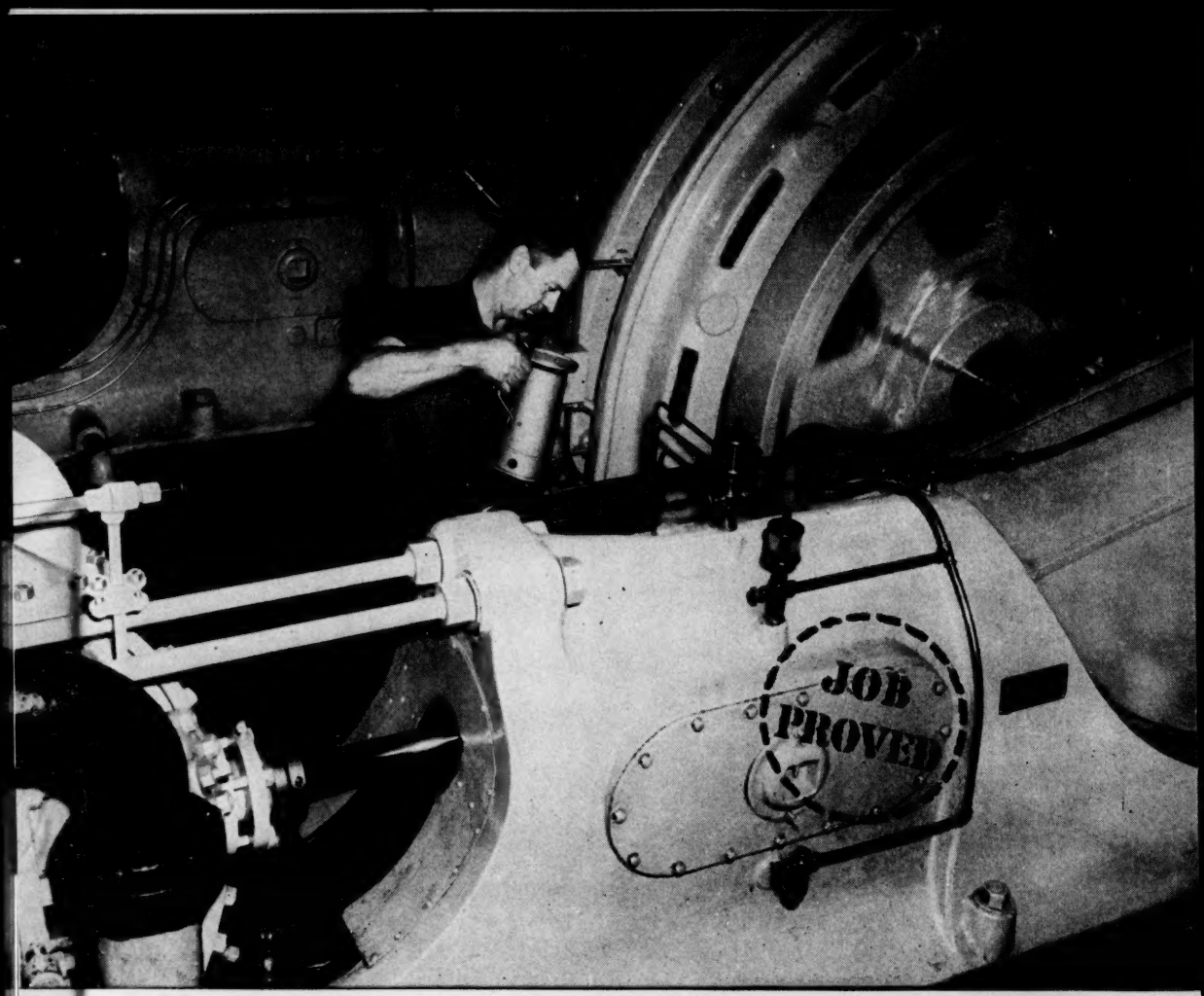

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NICKERSON & COLLINS CO.
433 N. Waller Ave., Chicago 44, Ill.
H. T. McDermott, Pres., H. T. Curtis, Vice-pres.,
L. R. Townsley, Sec.-Treas.

●

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LOS ANGELES: Duane Wanamaker
610 S. Broadway, Los Angeles 15, Calif.
WASHINGTON: 1706 L St., N.W.
Washington 6, D. C.

SUBSCRIPTION RATES: United States and Possessions, $3.00 a year; All Other Countries, $4.00 a year.
Single copies, 35 cents. Remittances must be made by postoffice or express money orders, international money orders, checks or drafts on Chicago or New York, payable to NICKERSON & COLLINS CO.

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Entered as second class matter at Chicago, Ill., August 8, 1891, under the act of March 3, 1879. Additional entry at Beloit, Wis., April 20, 1948.

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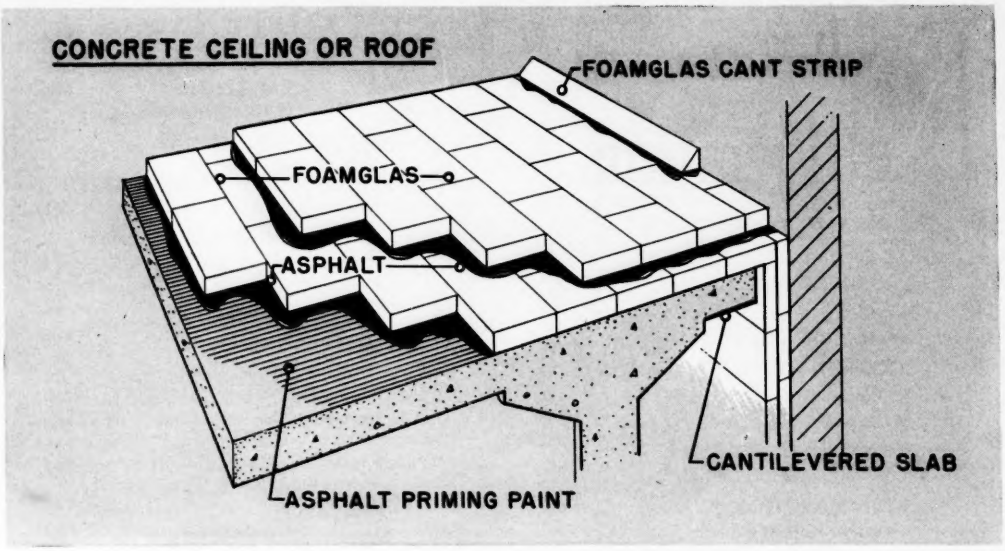

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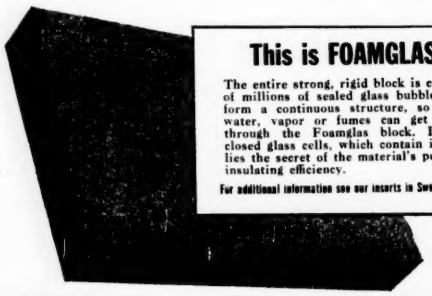

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IN THIS ISSUE —

Training Programs Prove Worth

It has frequently been related that training of workers was the key to the tremendous production which won the war. Many industries have profited by the lessons thus learned and are benefitting their operations by continuance of well-organized training programs within their plants. Most refrigerating plants are in the smaller size range but some of them have demonstrated the effectiveness of worker training. The report of a survey of training programs in the refrigeration plants is given on page 21 by Arthur M. Hill.

Value of Dollar Affects Business Figures

The decreased value of today's dollar has made necessary the establishment of new standards to evaluate profits and costs and other vital business statistics. They are discussed on page 23.

Piping System Calculations

Some years ago a slick lawyer won a lawsuit by convincing a jury that if water went in one end of a pipe at 70 pounds pressure it should reach the other end of the pipe at the same pressure. Most people will not be fooled like the jury was but many do not attach sufficient importance to the resistance to flow or pipe friction in lines and fittings. An extract from newly published hydraulic tables is given on page 25 along with detailed examples of the use of the data.

Dairy Refrigeration Methods

The dairy business became a mass production industry when refrigeration was applied to it. Progress in the application of refrigeration continues in the dairy industry so that milk and its products are chilled in the least possible time and are held at low temperature. As a result, Grade A milk is now widely available in this country and the volume consumed has greatly increased. At the same time refrigeration loads are better balanced and strict economy is reached in the use of refrigeration. The methods used are described on page 37 by Bert McKenna.

Merchandising Through Cost Controls

An interesting discussion of cost controls for refrigerated warehousing was presented at the recent NARW Convention at San Francisco by an executive who had made a thorough study of the subject from the standpoint of his company's operations. He told why modernized cost accounting records are necessary and some of the benefits obtainable from production standards. This paper is summarized in the article starting on page 51.

One Man Ice Plants

Previous articles have been published on the one-man ice plant operations by The Polar Ice & Fuel Co. of Indianapolis. With this system only one man, working on shift, cares for everything in the tank and machine room. The article on page 31 gives additional details about this remarkable arrangement.

Merchandising Ice in Gary

A group of civic leaders was entertained at luncheon on Washington's birthday by the Barnes Ice & Coal Co., Gary, Ind. After the luncheon the film "Naturally Yours" was shown and talks were made by a number of guests. See details in article on page 30.

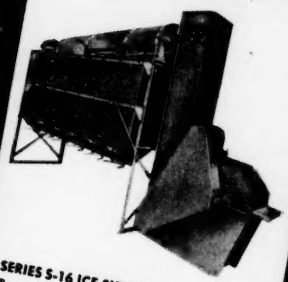
Cold Storage Holdings

Cold storage holdings February 1, both coolers and freezers, were down and below average according to monthly report of the Production and Marketing Administration of the U. S. Department of Agriculture. Coolers were 52 per cent occupied and freezers 71 per cent. Other details are given in the report on page 55. Report on cold storage stocks of frozen fruits and vegetables is given on page 56.

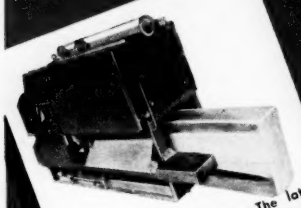
Frozen Foods Convention

All segments of the frozen food industry met together in annual convention in Chicago the week of March 7. Reports were optimistic. Consumer acceptance reached a new high last year and is continuing to make further advances. Recognition of the necessity of maintaining high quality was an outstanding theme of the convention, a report of which is published on page 58.

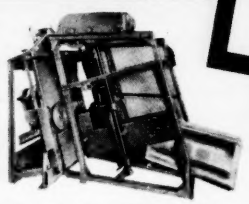
More Profitably GW



SERIES S-16 ICE SIZING UNIT—Combines Breaker-Elevator Unit S-16E and the new G-W 620 Precision Breaker with screen and bagging bin assembly. Four types meet varied requirements in elevator heights and bin capacities, assuring full production capacity and bagging output. Write for Bulletin No. 482.



NEW TYPE "G" SCORER — The latest development for fully automatic scoring in a medium-priced unit. Has the ruggedness of G-W's Type "F" Scorer, and the precision of the fully automatic Type "UM". Scores up to five 300-400 lb. cakes per minute. Streamlined, compact, safe. Write for Bulletin No. 489.



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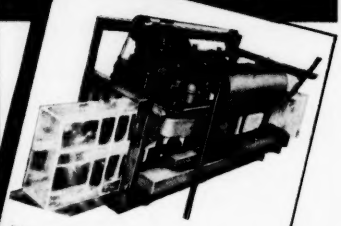

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e a look at your ice equipment. Is it doing a good job, bringing in your full share of profit? If not it will pay you to install durable, efficient G-W machines. Five outstanding units are shown here . . . others available include: Up-Enders, Breakers, Lifter-Feeders, Tiering Machines, Conveyors and a full line of ice tools . . . all of the same top quality and craftsmanship that have marked G-W as "Ice Equipment Headquarters" since 1814.

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HEADQUARTERS FOR ICE HANDLING, CUBING AND SIZING MACHINES AND TOOLS

Training Program in Refrigeration Industry

By Arthur M. Hill

Head of Mechanical Engineering Department
Tulane University, New Orleans

THE following paper, though presented by me, is really the work of almost forty ice and cold storage companies throughout the country who cooperated in replying to a questionnaire sent to them. The replies have been totalled and in many cases the comments on the question are given. The different questions in the questionnaire are identified by number and are followed in each case by the replies received.

Questionnaire on Training Systems in the Ice and Cold Storage Industry

1.—Do you have a planned training program for new employees? 13 YES. 23 NO.

2.—Do you have a planned training program for up-grading regular employees? 11 YES. 25 NO.

3.—If you are using some such plan or plans, will you briefly outline it? (a) New employees training principally in safety. (b) Encourage them to train themselves through N.A.P.R.E. or correspondence courses to improve their positions in the company.

Outline of Plans

Some answers to Question 3 were as follows

Our organization is quite small and union shop rules prevail.

We have weekly meetings with our personnel man in charge of training.

The senior men get the promotions and better pay, as their longer service generally has educated them to the job requirements. It seems difficult with only seven men in engine room to carry out a planned program. We do have material and trade papers accessible to all.

The attached scoring sheets are used by our route superintendents in training the men under them. Our training program is all built on the "on the job" training method. (Author's note: The three scoring sheets mentioned were excellent examples of an effective driver training program.)

Weekly school.

Employees who merit consideration are trained for the next advancement step. The employee acquires the knowledge of two positions—his rated position and the next rated position in the line of advancement.

Meetings are held in spring at 8:00 P.M. National Association training films are shown and discussed. Over refreshments we dispute a great deal with our older employees in starting new men.

Our up-grading is done entirely on union rules and regulations, which are principally seniority. And we do not like it.

During the period a helper is serving, he is being prepared to become a driver, in charge of the truck. The ice puller is advanced to engineer when a vacancy develops. This, of course is slow; not using but three engineers.

We start a man in lowest position, and advance him according to his ability until he reaches a position on the dock as a checker. He checks, greets customers, etc.

We use the employee training material prepared by the personnel training and marketing department of our national association. This includes a printed text, plus co-related sound-slide films. We also use motion pictures, plus on-the-job instruction.

Experience and length of service, plus ability and desire to work.

Chief engineer of each plant outlines training.

Most of our employees have been with us a number of years, and training of new employees is taken care of by the department heads. I think our negative answer to the first two questions more clearly gives you the picture you wish.

When there is a position open those who so choose fill out a written questionnaire.

We use visomatic and guide material furnished by the National Association of Ice Industries.

Need for Training

4.—Even though you are not now using some planned instruction of up-grading assistance, do you think it is a good idea? (Comments for and against would be appreciated.) Answers to Question 4 were as follows:

We do think that is a good idea now that labor turnover has shown a tendency to return to normal.

The number of key positions is very small and the turnover very low. Also the skill required does not warrant continuous training programs.

We certainly do, and would be glad to use such a program if we could locate one.

There is a great need for qualified engineers in the ice industry. It is our feeling that there is a difference between the ice engineer and that of comfort cooling engineers.

Planned employee training is a MUST for every ice company which hopes to hold its business in the future.

We think a training program is a good idea. One of our men is the instructor in the N.A.P.R.E. class, so we are pushing this class.

While the writer's opinion as the whether "planned instruction or up-grading assistance" in a large city warehouse is probably of very little value, I still might say that I can see how such instruction or assistance might be of value under circumstances other than those with which I am familiar.

Up to a certain point. Seniority still seems to be the dominant grounds for promotion.

Yes. While we do not have a planned training program, we do have trainees from a practical point, elevating what we call ice pullers to engineers and then to chief engineers. A program is badly needed.

It is my belief that failure of the Ice and Refrigerating Industry to provide some such method accounts to a great extent for the position we now find ourselves in; namely, an acute shortage of trained men and a desire or lack of desire by young men to enter the industry.

I am strongly in favor of planned instruction, and we are using this in our operation as much as possible. We have no up-grading assistance at present. However, this does not mean that we do not hope to have a program of up-grading in the future.

Any plan for training employees in selling young men in practical ice-making would be good. There is a field for refrigerating engineers.

*Presented at the 39th Annual Convention of NAPRE.

Chief engineer, a member of the union, has complete charge of hiring and firing.

Yes. So far, we have been fortunate in getting the trained men we needed from the "ranks," where they gradually picked up the experience necessary.

Yes. We are unable to attract any young people to our industry, and any plan toward that end is desirable.

In a small organization personal assistance can be given interested and worthy individuals more satisfactorily than so-called planned training.

We are favorably inclined toward the instruction program and up-grading of employees. As to plant employees, this is difficult, as they are all unionized.

Yes. We believe it is worth the money it costs us to have trained men to fill responsible positions in our plants.

We think it an excellent idea, but we have so few employees it almost takes care of itself.

No. Although our company has a several million dollar investment, we do not feel our operating force is large enough to indicate a planned course.

Yes. So far we have not been able to work out a satisfactory system with the labor organization with whom we deal.

Our establishment is too small and embraces too many different activities to give other than basic training.

We think it is an excellent idea. If we could eliminate the seniority rule. As it is, we have very little to offer a new employee.

(A number simply replied "Yes" with no comments.)

Other Facilities

5.—Are your operators encouraged to join and take part in the educational programs of organizations like the National Association of Practical Refrigerating Engineers, and American Society of Refrigerating Engineers, etc. 24 YES. 10 NO.

6.—Does your management make a point of posting notices of these meetings on the plant bulletin board? 12 YES. 21 NO.

7.—(a) Are regular safety meetings held? (b) Do safety discussions "spill over" into technical operating problems? (a) 23 YES. 12 NO. (b) 9 YES. 8 NO.

Conclusions

Each tabulation deserves some consideration. The first, dealing with a planned training program for each employee, shows that about two thirds do not have such a program. That is not too bad a showing, considering some replies were received from organizations employing only a few men. In most industries, a planned program for the new employees has paid dividends in a more satisfied and loyal worker from the start.

Question No. 2 is divided about the same way as No. 1, which is what might be expected. Again, size of plant has much influence on this tabulation. Interest of the union in increasing the knowledge and skill of its members would be of tremendous benefit to the ice and cold storage industry.

Questions 3 and 4 are given with comments which were sent in.

Question No. 5 indicates that excellent work is being done by national organizations. There are a great many individuals who are not taking advantage of the educational opportunities offered them. There is still a lot of "missionary" work to be done. True, some plants are in towns too small for a chapter of a national organization, but the indifference to chapters in large cities, in which some plants are located is amazing.

Question No. 6 also indicates that more publicity should be given to organizations which can be helpful to the operator.

In plants so located that refrigeration or similar organizations do not have chapter meetings in the immediate areas, there are two possibilities for further study. One, correspondence schools; two, a planned study course, with text book material, in which two or more employees may work together. In either case, conscientious and continued effort will invariably increase the technical knowledge and "know-how" of the participating group.

The replies to question No. 7 were indeed encouraging. Almost two thirds indicated some form of safety program. There is still need for greater efforts, however, as the ice and cold storage industry has a poor accident record, being close to the worst of all industries.

Again I want to thank all those who have made this cross-section of the educational picture of the ice and cold storage industry possible. I hope that the exchange of ideas and suggestions will be helpful to all interested in the advancement of the industry.

Construction and Arrangement of Milk Plants

A BULLETIN on construction and arrangement of milk plants has been issued by the United States Department of Agriculture prepared by C. J. Babcock, formerly with the Dairy Branch, Production and Marketing Administration.

Milk is usually shipped from the country to a city milk plant where it is inspected and pasteurized and otherwise prepared for sale as milk or cream and delivered in suitable-sized containers to retail stores or directly to individual consumers.

In order to fulfill its purpose satisfactorily, the milk plant should be a modern sanitary building of durable construction. It should have sanitary and up-to-date equipment, and the arrangement of the building and equipment should be such that all operations can be conducted efficiently and economically.

The milk-storage or refrigerator room must be well insulated to keep the milk always at a low temperature. The most commonly used insulating materials are cork board, mineral wool, vegetable fiber, sawdust, and shavings, which are used in combination with wood, cement, masonry and air spaces. Cement plaster should be applied over the inside walls and ceilings in order to protect the insulating material from moisture. One of the most satisfactory types of construction is about 4 inches of cork board insulation (6 inches is better, and more is seldom necessary) with cement plaster applied on the inside. Whatever insulating material is used, it should be placed in each of the side walls, the ceiling, and also in the floor. The floor of the milk-storage room should be of concrete laid solidly on the insulating material. Good drainage to a drainpipe, carefully trapped to prevent warm air from entering the room, is very important.

In order to save refrigeration the milk-storage room should be located a reasonable distance from the boiler room and only a minimum of wall surface should be exposed to the outside air or sun. The doors of the room should fit tight, swing outward, and be adapted to quick handling. A vestibule, while taking up some extra space, will prevent considerable loss of refrigeration.

A well-insulated milk-storage room is necessary in order to store the milk at a low temperature from the time it is put into the bottles until it is sent out on the delivery trucks.

Where Do You Stand on Your Capital Investment?

By Arthur Roberts

While the volume of sales profits is important to any business, the yardstick of profitableness is the return on invested capital. This article tells How and Why.

"HOW much profit did I make on sales?" Nine out of ten men in business ask this question when their operating figures are tabulated at the end of the year, and many otherwise capable operators are numbered in this nine out of ten. They overlook the fact that the ultimate yardstick of profitableness is the return on their invested capital, which is the difference between the assets and the liabilities of a proprietorship and the capital stock plus the surplus for a corporation. The net profit on sales is a secondary yardstick when considering the progress of a business over a period of years.

If one must invest a million dollars to make $100,000 sales and nets a high percentage of profit on sales, say 20 per cent, that's only $20,000 on a million dollar investment, or two per cent a year. More than twice this return may be obtained on safe outside investments with no managerial worries. A man can go fishing and live the life of a country gentleman with no labor troubles and overheadaches. Whether one has a million dollars invested in a business or a much less amount, the same thing holds true. One should always keep an eye on the return on capital investment.

Sales and Invested Capital

The profit on sales, however, has been stressed so often in the past that most small business men think only of this return and ignore completely the return on their invested capital. This was always a good measurement of managerial "know-how," and since the war, its omission from business analysis is likely to do more harm than it did before the war because profits have been higher and net worth of a business should have increased proportionately. For example, suppose John Smith showed this profit and loss statement in 1938. The figures are merely illustrative and not intended to represent the operating ratios of any iceman or group of icemen.

Sales	$50,000
Cost of sales	30,000
Margin on sales	$20,000
Overhead expense	16,000
Net profit on sales	$ 4,000—(8%)

Suppose this was his balance sheet in condensed form for the same year (1938).

Current assets	$10,000	Current liabilities	$ 5,000
Fixed assets	20,000	Net worth	25,000
Total	30,000	Total	30,000

He earned 8 per cent on sales, or $4,000, which is 16 per cent on $25,000 net worth. That was in 1938.

Since the war, Smith's business has increased in volume, he averaged $80,000 yearly sales and 8 per cent net, or $6,400 yearly average. For the ten years intervening, these profits have increased his net worth $64,000. He has had no losses to charge to net worth, and so, it has jumped from $25,000 to $90,000.

In 1948, he had an average year, he did $80,000 in sales, earned 8 per cent, or $6,400 net profit, which is 60 per cent more net in dollars than he earned in 1938, when the net was $4,000. Inasmuch as he focuses all attention on the net profit on sales, he is satisfied.

Considering only the sales volume and the net on sales, that isn't a bad showing in view of the fact that costs and taxes have increased heavily, but if Smith prepares a balance sheet in 1948 and computes the 1948 net profit on the net worth, he now earns less than 7.2 per cent return on his capital investment, whereas, he earned 16 per cent in prewar days: to wit:

Current assets	$24,000	Current liabilities	$ 4,000
Fixed assets	70,000	Net worth	90,000
Total	94,000	Total	94,000

During the intervening years, he has more than doubled his cash in bank because he has been earning more money. He has been pushing sales during the past few years, and so, his receivables have increased. He bought the building housing his plant at an inflated price and installed new equipment, which increased his fixed assets from $20,000 to $70,000. He has a lot more fixed capital to carry, a bigger capital investment, but he has cut the return on investment to less than half of that in prewar days.

Of course, this is an extreme case, which we outline just to emphasize an important phase of business analysis that should be watched from year to year. The current ratio, the difference between the current assets and the current liabilities, which gives the working capital, and the ratio of net profit to net worth are the two most important yardsticks of operating efficiency. Both are pretty much ignored by many business men.

Easy Times, Easy Profits

When times are good and sales come easy, it doesn't take much business wit to earn a profit. Since the war almost any established business could show a profit. But, as things are shaping up, it may not be long before those in all business fields will have to pay more attention to business analysis if they expect to earn satisfactory profits.

Because of what has happened during the past ten years, the return on capital investment is one yardstick of business analysis that should be watched carefully. If this return has decreased since prewar days, you are not making your invested dollars work hard enough today. If our experience is any criterion, we believe that many owners or managers are earning less profit on their capital investment now than they earned before the war. This means that their business has slipped somewhere. That "somewhere" depends upon circumstances. It may be over-expansion, high credit losses or "invisible losses" of one kind or another.

Bad managerial methods depress the turn on net worth, otherwise, the return on invested capital. By improving managerial practices, keeping adequate and accurate books and analyzing business figures regularly, the return on net worth can be increased substantially.

Stock has turnover, so has labor, so has net worth. The iceman is familar with the first two turns, but the last is quite Greek to him, yet, it is one of the most important turns in his business. This is how to figure it.

Profit and loss statement

Sales	$50,000
Cost of sales	32,500
Margin on sales	17,500
Overhead expense	15,000
Net profit on sales	2,500

Balance Sheet

Current assets	$10,000	Current liabilities	$ 5,000
Fixed assets	20,000	Net worth	25,000
Total	30,000	Total	30,000

These statements show two turns a year on net worth, the net worth divided into the sales, and 10 per cent on capital invested, $2,500 sales to $25,000 net worth. Before the war, our surveys showed that the average turn on net worth was 3.5 and the return on capital investment, about 15 per cent. However, the turn on net worth depends upon sales, profits and the dollars invested in the business and there are as many different combinations of these three factors as there are hands in poker.

Over-capitalization is at the root of much of the trouble when the turn on net worth is low. That is one reason why this turn should be watched. It flashes the red light when too much money is being put into the business for the return it yields. It tells when to put promotional pressure behind sales to get enough business to justify the investment.

Before the war, spot-checks of icemen with high capital investments showed that many had a low turn on net worth, sometimes less than 3, whereas, those with smaller business investments, from $10,000 to $25,000 net worth, earned as high as 24 per cent on their invested dollars. This would indicate that some large concerns earn less than they should on their invested dollars, which may be due to the fact that they pay too little attention to the yield on their invested capital or they have invested too much in expansion wihout due consideration for all influencing factors, or they are not promoting sales with efficiency.

Because there are so many variables in the picture, we cannot give specific recommendations. It can be said, however, that the man who gets a big return on his invested dollars is a topflight operator, that all should keep their eye on this return and compare the yield with that of safe outside investments. If you are only approximating outside yields on safe investments, then you are not getting enough return from your own business for the risk and overheadaches, and when sales recede, the return may drop to less than the yield on safe outside investments. Business may take the low road some day and then it won't be so healthy for the man who has been making a low return on capital invested while business has been on the high road. Even if we go along full speed ahead, it is wise business to be prepared for the worst.

Check this return against prewar figures. If you are doing a good business job, this return should have increased, not decreased. Watch it periodically. Try to keep as far above the return on safe outside investments as possible to pay well for your business efforts and risk, and to "cushion" a decrease to outside yields or less if business tapers downward. When you contenmplate expansion, try to appraise the effect on this return.

Finally, the higher your return on capital investment, the more your business is worth on the market. This return is the most important factor when appraising the value of a business. A buyer considers the excess of the earnings on net worth over the earnings on safe outside investments when he dickers for possession of an established business.

New Office Building Air Conditioned

THE equivalent of a 2,000-ton iceberg, or a shaft of ice thirteen miles high and one foot square, melting every 24 hours, highlights the super air-conditioning system to be installed in New York City's newest skyscraper under construction at 100 Park Avenue, it was announced by Alfred L. Jaros, Jr., of Jaros, Baum & Bolles, consulting engineers. The building will be 36 stories high and will cost $20,000,000. The air conditioning system will be part of the basic construction, and all areas of the building will be conditioned 12 months a year, by cooling and dehumidifying in summer, heating in winter, and ventilating at all seasons.

The system is featured by a unique zone arrangement for conditioning independently both inner and outer spaces of each floor. Designed by Jaros, Baum & Bolles, the zone layout not only insures uniform effectiveness of the air conditioning but also adds to the flexibility of control. It will be possible to provide varying degrees of conditioning both to individual floors and to portions of those floors as they are affected by changing heat from the sun, conduction of heat through windows and walls, and wind. The system will not only automatically compensate for seasonal and daily weather changes but also for the effect of heat and moisture derived from people and lights.

The outer zones, or areas adjacent to the windows and extending inward for fifteen feet, will be provided with Carrier Corp.'s new Weathermaster System of peripheral conditioning. This will treat a quantity of outdoor air for ventilating purposes and distribute it through vertical riser pipes. Paralleling these pipes will be a set of supply and return pipes through which pumps and heat exchangers will circulate cold water in summer and hot water in winter to supply additional cooling, or heating, to these spaces as needed.

Under each window there will be an individual induction unit, concealed within the window sill, which will automatically mix, treat, and redistribute outdoor air and recirculated air from the room itself in sufficient quantity and proportion to maintain the atmospheric conditions desired by the occupants of that area. This operation will be controllable by an individual valve.

The interior zone system, for spaces more than fifteen feet from the outside walls, will draw air from corridors or open spaces and mix it at the fan room with an equal amount of outdoor air. Properly filtered, cooled or warmed, the mixture will then be distributed by the main fan through ducts to strategically-located outlets. A separate small fan room will serve every two or three floors up to the 20th, while the tower floors will contain a single primary fan room with local mixing units on each floor.

Steam derived from the mains of the New York Steam Co. will provide heating in winter and, in summer, will be used to drive the centrifugal compressors to chill the water that will be pumped to all points where cooling is required. A separate system of water pipes will operate with the cooling towers on the roof to condense the refrigerant as well as the steam used in the driving turbines.

Mechanical exhaust ventilation will be provided for washrooms and other spaces requiring such treatment. Air conditioning of spaces in the ground floor and basement will be provided by the tenants entirely independent of the main system and will make possible the operation of such spaces during hours when the office areas are unoccupied.

One of the largest office rental structures now under way in the United States, the new building will contain a total of 660,000 sq. ft. of rentable area, with as much as 32,000 sq. ft. available on lower, single floors. Tower floors will each contain a total of 7,700 sq. ft.

Flow of Water in Pipes

IN SOME plants it would appear that the water lines have been sized on the basis of the pump connections, although in some cases bushings or reducers are applied to accommodate even smaller lines. The result frequently is high pump power consumption or insufficient flow. Piping should be designed on the basis of a practical minimum total head to insure economical pumping cost and full flow.

Recently new hydraulic tables have been published and some of the data has been abstracted in the attached tables. A sample calculation demonstrates their use.

Sample Calculation

A 400 gallon per minute pump has a suction lift of 5 ft. through a 5 in. standard pipe 15 ft. long with a foot valve and one 90 deg. screwed elbow in the line. The discharge is through a 4 in. standard pipe 120 ft. long with a net elevation of 45 ft. The line contains a gate valve and 5 screwed 90 deg. elbows.

Suction	Discharge
5 in. pipe, 15 ft. long	4 in. pipe, 120 ft. long
1 Foot valve	1 Gate valve
1 Screwed elbow, 90 deg.	5 Screwed elbows, 90 deg.
Net lift, 5 feet	Net lift, 45 feet

Suction Line Calculation

From the tables for a 5 in. pipe at 400 gpm., the Velocity Head $V^2/2g$, is 0.639 and the Pipe Friction Head, h_f, is 2.72 ft. per 100 feet of pipe. The resistance coefficient, k, for a foot valve is 15 and for the elbow is 0.55 to 0.90 or about 0.70 average.

The lost head in the foot valve will be

$$h = k \frac{V^2}{2g} = 15 \times 0.639 = 9.58 \text{ ft.}$$

The lost head in the elbow is

$$0.70 \times 0.634 = 0.447 \text{ ft.}$$

The lost head due to pipe friction will be

$$5/100 \times 2.72 = 0.136 \text{ ft.}$$

The sum of these and the 5 ft. lift gives the total

Suction Head = 9.58 + 0.447 + 0.136 + 5 = 15.156 ft.

This is a fairly high suction head for some pumps. A large portion of the suction head is found in the resistance of the foot valve. Where the foot valve of line size places too much resistance in the line a larger foot valve can be used with a tapered reducer. For instance with a 6 in. valve the resistance coefficient, k, is 0.307 for 400 gpm. which is less than half that for the 5 in. foot valve at this flow. The loss in head would be $0.307 \times 15 = 4.6$ ft.

Then the suction head = 4.6 + 0.447 + 0.136 + 5 = 10.18 feet.

Discharge Line Calculation

From the tables for 4 in. pipe at 400 gpm. the Velocity Head, $V^2/2g$,is 1.58 and the Pipe Friction Head, h_f, 8.47 ft. per 100 feet of pipe.

The resistance coefficient, k, for the gate valve may be taken at an average value of 0.12 and the 5 elbows as above at 0.7 each. In the calculation of head loss due to fittings the k values may be added to simplify calculations or $0.12 + 5 \times 0.7 = 3.62$ total k.

The lost head in fittings will be

$$h = k \frac{V^2}{2g} = 3.62 \times 1.53 = 5.72 \text{ feet}$$

The lost head in pipe friction = $120/100 \times 8.47 = 10.164$ feet

The discharge head including the 45 ft. lift is

Total discharge head = 5.72 + 10.164 + 45 = 60.88 ft.

Total Head

The total head on the pump is the sum of the suction head and the discharge head.

With the 5 in. foot valve

Total head = 15.156 + 60.88 = 76.0 feet.

With the 6 in. foot valve

Total head = 10.18 + 60.88 = 71.0 feet.

Resistance of Fittings

In many tables it is customary to give the resistance of fittings as equivalent to so many feet of pipe. This is an approximation which is not accurate at widely differing velocities. For this reason the velocity heads and k coefficients are given here so that the resistance of fittings can be calculated. As will be noted in the Discharge Line calculation given above, it is not necessary to calculate the loss in head for individual fittings. The k coefficients for all fittings can be added together and the total loss in head calculated in one operation.

Resistance Coefficients for Valves and Fittings

Loss in head = $k \times V^2/2g$ in feet of fluid.

Elbow, regular 90°, screwed, k = 0.55 — 0.90
Elbow, long radius, 90°, screwed, k = 0.22 — 0.60
Elbow, regular, 45°, screwed k = 0.30 — 0.42
Return bend, close pattern, screwed k = 0.75 — 2.2
Inlet, square edged, k = 0.47 — 0.56
Tee, standard, screwed k = 0.4
Globe valve, bevel seat, k = 6.5 — 7.2
Gate valve, double disc, k = 0.08 — 0.13
Swing check valve, k = 0.6 — 2.3
Angle valve, k = 2.1 — 3.1
Foot valve, k = 15

Age and Scale

As steel pipe ages the inside surface may become rough and scale or sludge coatings may build up. It is impossible to give any specific factor for roughness because of the variables involved. Some authorities double the friction head for the pipe to approximate the effect of aging and roughness. At high velocities the added resistance may be even greater.

Scale and other surface coatings not only result in roughness but also reduce the actual diameter of the pipe. If frequent cleaning is not possible then the pipe size should be increased to allow for whatever reduction in diameter will occur between periods of cleaning.

New Hydraulic Tables

The values for Velocity Head and pipe friction head shown in the accompanying tables have been abstracted from a new publication of the Hydraulic Institute. Since 1946 the Institute has been carrying on the work in preparation for a new compilation of hydraulic tables. With the cooperation of Prof. C. P. Kittredge of Princeton University and the assistance of its members, the new tables were prepared.

The friction loss for water is shown in the new Hydraulic Institute tables in tabular form for pipe sizes ⅛ to 84 in. On the smaller pipe sizes, the tables are based on wrought

iron or steel schedule 40 pipe, and for the larger sizes, separate tables are given for each standard size for steel and asphalt dipped cast iron pipe. In each table, the flow in gpm. and cfs. are shown with the corresponding velocity, velocity head, and friction loss per 100 feet of pipe. The data is carried to three significate figures and is listed in small increments to avoid the necessity for interpolation.

For computing the friction loss for liquids other than water, a series of charts are provided for pipes ranging from ½ to 12 in., showing the complete range of viscous and turbulent flow.

In addition to the friction tables, there is a very complete listing of the losses in valves and fittings. Sectional

(Continued on page 62)

Friction Loss for Water in Feet per 100 Feet of Pipe

Note: All pipe sizes are nominal, see Inside Diameter (ID) as shown. The Friction Head (h_f) as shown applies to new wrought iron or steel pipe, Schedule 40, Standard Weight.

Flow GPM	$V^2/2g$ Feet	h_f ft. per 100 ft. of pipe
½ in. Pipe, ID = 0.622 in.		
1	0.017	1.86
2	0.069	4.78
3	0.156	10.0
4	0.277	17.1
5	0.433	25.8
6	0.624	36.5
7	0.849	48.7
8	1.109	62.7
9	1.40	78.3
10	1.73	95.9
12	2.49	136.
¾ in. Pipe, ID = 0.824 in.		
2	0.022	1.21
3	0.050	2.50
4	0.090	4.21
5	0.141	6.32
6	0.203	8.87
8	0.360	15.0
10	0.553	23.0
12	0.810	32.6
14	1.103	43.5
16	1.44	56.3
18	1.82	70.3
20	2.25	86.1
1 in. Pipe, ID = 1.049 in.		
4	0.034	1.29
6	0.077	2.68
8	0.137	4.54
10	0.214	6.86
14	0.420	12.8
18	0.694	20.6
22	1.036	30.2
26	1.45	41.6
30	1.93	54.6
34	2.48	69.4
38	3.09	86.0
42	3.78	104.5
46	4.53	124.
1¼ in. Pipe, ID = 1.38 in.		
4	0.011	0.34
8	0.045	1.18
12	0.103	2.48
16	0.183	4.20
20	0.286	6.34
26	0.483	10.37
32	0.732	15.3
33	1.032	21.3
44	1.38	28.2
50	1.79	36.0
60	2.57	51.0
70	3.50	68.8
80	4.58	89.2

Flow GPM	$V^2/2g$ Feet	h_f ft. per 100 ft. of pipe
1½ in. Pipe, ID = 1.61 in.		
8	0.024	0.56
12	0.055	1.16
20	0.154	2.94
30	0.347	6.26
40	0.618	10.79
50	0.965	16.4
60	1.39	23.2
70	1.89	31.3
80	2.47	40.5
90	3.13	51.0
100	3.86	62.2
120	5.56	88.3
2 in. Pipe, ID = 2.067 in.		
10	0.014	0.25
20	0.056	0.87
40	0.227	3.10
60	0.511	6.59
80	0.909	11.4
100	1.42	17.4
120	2.05	24.7
140	2.78	33.2
180	4.60	54.1
200	5.68	66.3
220	6.88	80.0
240	8.18	95.0
2½ in. Pipe, ID = 2.469 in.		
20	0.028	0.36
26	0.047	0.58
35	0.085	1.00
50	0.174	1.94
70	0.342	3.63
100	0.698	7.11
140	1.37	13.5
180	2.26	21.9
220	3.38	32.2
260	4.72	44.5
300	6.28	58.5
350	8.55	79.2
3 in. Pipe, ID = 3.068 in.		
50	0.073	0.66
75	0.165	1.39
100	0.292	2.39
150	0.659	5.14
200	1.17	8.90
260	1.98	14.7
320	3.00	22.0
380	4.23	30.7
440	5.67	40.9
500	7.32	52.5
550	8.85	63.2
600	10.5	74.8

Flow GPM	$V^2/2g$ Feet	h_f ft. per 100 ft. of pipe
3½ in. Pipe, ID = 3.548 in.		
50	0.0410	0.33
100	0.164	1.17
150	0.368	2.48
200	0.655	4.27
260	1.11	7.04
320	1.68	10.48
380	2.36	14.6
440	3.17	19.4
500	4.09	25.0
600	5.89	35.6
700	8.02	48.0
800	10.5	62.3
4 in. Pipe, ID = 4.026 in.		
50	0.024	0.17
100	0.098	0.62
150	0.222	1.32
200	0.395	2.27
300	0.888	4.89
400	1.58	8.47
500	2.47	13.0
600	3.55	18.6
700	4.84	25.0
800	6.32	32.4
900	8.00	40.8
1000	9.87	50.2
5 in. Pipe, ID = 5.047 in.		
100	0.040	0.20
200	0.160	0.73
300	0.360	1.58
400	0.639	2.72
500	0.999	4.16
600	1.44	5.88
700	1.96	7.93
800	2.56	10.22
900	3.24	12.9
1000	4.00	15.8
1100	4.84	19.0
1200	5.76	22.5
6 in. Pipe, ID = 6.065 in.		
200	0.076	0.30
300	0.172	0.64
400	0.307	1.09
500	0.479	1.66
600	0.690	2.34
700	0.939	3.13
800	1.23	4.03
900	1.55	5.05
1000	1.92	6.17
1100	2.32	7.41
1200	2.76	8.76
1300	3.24	10.2

The Ice Industry

National Association of Ice Industries

Executive Offices
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PRESIDENT
M. J. Garvey, St. Joseph, Mo.

EXECUTIVE SECRETARY
Mount Taylor, Washington, D. C.

New Wage Hour Bill Has Drastic Effect Upon Ice Company Operations

THE much awaited Wage-Hour Bill has been reported out of the Committee on Education and Labor and now goes to the House. A bulletin issued by the National Association of Ice Industries summarizes the major changes the new Bill makes in the present law, in terms of its application to ice company operations. These changes are as follows:

The minimum wage is increased from 40 to 75 cents an hour.

Coverage is expanded, by technical language, to cover virtually every ice company in America. The "affecting" commerce language, as such, contained in H. R. 2033, is deleted but the identical objectives are accomplished by substitute language, included in the new bill.

Transfers to the Secretary of Labor authority to administer and enforce the Act.

Empowers the Secretary of Labor to issue binding rules—"to write his own law."

Provides criminal penalties for violation of "a rule" issued by the Secretary.

Empowers the Secretary of Labor to collect "underpayments" for employees.

Establishes a four-year statute of limitations on employee suits instead of two years, as provided at present.

Outlaws Belo-type contracts.

What Next?

Despite all the work that has been done thus far, the proponents in so far as the House Committee is concerned. have won on every count. However, the bulletin states the feeling still prevails that the businessmen of this country are strong enough and influential enough to stop this legislation, if they determine to do so. A strong industry record has been made in Committee which will serve as the basis for the fight when the measure reaches the House floor—scheduled to come up March 21.

The bill is scheduled to go to the floor under the "five-minute" rule. This means that any member of the House will be permitted to speak five minutes for purposes of offering an amendment. Likewise, any other member can speak for five minutes in support of, or against an amendment. If this procedure is followed, three things can happen (1) the bill as now written can pass, (2) it could largely be rewritten on the floor, or, (3) it can be so changed by amendments as to force a recommitment back to the House Committee, with instructions to prepare a more reasonable and acceptable measure.

It is this latter objective to which opponents of the Bill plan to direct major efforts. To do this the cooperation of all members of the ice industry is needed. While the response of the industry to date on this subject has been good, there must be an increase in efforts. Hundreds of letters, telegrams, and telephone calls have been sent and made. In addition, scores of ice company executives have already been to Washington to talk personally with their Representatives in Congress. A telegram has been sent by Secretary Mount Taylor to all unit secretaries asking for more to come.

The job ahead, the bulletin concludes, is clear-cut and difficult. The Association will do its best to keep members informed. In the meantime the members themselves can help by keeping in touch with their representatives in Congress.

Harper Resigns—Accepts Position With National Business Papers

THE resignation of Robert E. Harper as Advertising and Publicity Director for the National Association of Ice Industries has been announced. He has accepted a position as Executive Director of the National Business Papers, Inc., an organization made up of controlled circulation of business papers.

Mr. Harper has been with the National Association of Ice Industries since April, 1945 and has been very successful in directing the publicity and advertising program under the National Ice Public Relations Department of the National Association. No announcement has been made as to his successor.

Utica Company Abandons Natural Ice

CUTTING of ice for storage purposes on the southern reservoirs near Pleasant St., Utica, N. Y., is likely to be abandoned forever. Dewey D. Hill, head of the Utica City Ice Co., which has the franchise and leases land from the city for the harvest and storage of ice from the southern reservoirs, said enough ice was now being manufactured at the Wurz Ave. plant to take care of all normal needs.

Some years ago 40,000 tons of ice were put into storage every year in Utica. Business spurted during the war, also, when refrigerators were "hard to get," but now the demand is getting back to pre-war levels. This winter has been so mild it is doubtful if the ice on the reservoirs is really thick enough to cut for any commercial crop.

Largest National Ice Marketing Institute Class Graduates

THE fifth class of the National Ice Marketing Institute, known as the Pentagon Marketeers, was completed February 4 with eighteen graduates. This is the largest class enrolled in the Institute this year. All sections of the country were represented in the class, from California to New York and New Jersey, from Ohio to Florida and Texas, and other states between, including Indiana, Missouri and Iowa. Over 300 years of experience in the Ice Industry was represented in the group of managers, district managers, sales managers, assistant managers, training directors, delivery superintendents, and route supervisors.

The Institute instructors were guests of the class at the graduation dinner. Mount Taylor, Executive Secretary of N.A.I.I., congratulated the men and presented the displomas with the statement: "The future of the ice industry depends upon what the progressive men like you do with the ideas, information, and methods you have gained." Kenneth Head, Route Supervisor, Artesian Ice Co., Fort Madison, Iowa, and Frank Eldredge, Assistant Manager, Eldredge Coal & Ice Co., Auburn, N. Y., were recognized for the top grades in the class.

Entertainment for the dinner was conducted by Rudy Hoenig (Class President), superintendent of agencies, Union Ice Co., Los Angeles, Calif.; Richard Fischer (Class vice-president), assistant manager, Service Delivery Co., Akron, Ohio; Ed Reeder, manager of appliance division, Southland Corp., Dallas, Texas; Henry Dithmer (Class Secretary), executive vice-president, Polar Ice & Fuel Co., Indianapolis, Ind.

Seated, left to right: Edd Reeder, Southland Corp., Dallas, Tex.; Albert Kutcher, Artesian Ice Co., Madison, Ia.; Gordon Wilson, Ice Service, Inc., Evansville, Ind.; Stewart Saunderson, City Ice & Fuel Co., Cleveland, Ohio; Harold Young, Polar Ice & Fuel Co., Indianapolis, Ind.; Charles Bardol, City Ice & Fuel Co., St. Louis, Mo.; Mount Taylor, National Association of Ice Industries; Ray Pillar, National League of Wholesale Fresh Fruit & Vegetable Distributors and instructor on Displaying Fresh Produce. Second Row, left to right: J. C. Ruppert, National Ice Marketing Institute; George Leach, Ice Service, Inc., Evansville, Ind.; Frank Eldredge, Eldredge Coal & Ice Co., Auburn, N. Y.; Eugene Lusk, Daniel DePrez Mfg. Co., Shelbyville, Ind.; Rudy Hoenig, Union Ice Co., Los Angeles, Calif.; Ellsworth Killebrew, Union Ice Co., San Francisco, Calif.; L. F. Overman, American Bottlers of Carbonated Beverages, and Instructor on Beverage Chest Merchandising; Frederick Smith, Bahrenburg Co., Trenton, N. J. Third row, left to right: Edwin Stevens, George Washington University, and instructor on Talks to Employees and Public Groups; Claude Martin, The Southland Corp., Dallas, Tex.; Bob Harper, Advertising Director, N.A.I.I., and instructor on Local Public Relations and Advertising; Henry Dithmer, Polar Ice & Fuel Co., Indianapolis, Ind.; Robert Evory, Binnewater Lake Ice Co., Kingston, N. Y.; Richard Fischer, Service Delivery Co., Akron, Ohio; Kenneth Head, Artesian Ice Co., Fort Madison, Iowa; John B. Pope, Specialist in Adult and Business Education, U. S. Office of Education, and instructor in Employee Relations and Employee Problems; Louis Hill, vice-president Middle Florida Co., Tallahassee, Fla.

Warren Returns to City Products

THE City Products Corp., formerly the City Ice & Fuel Co., of Chicago, announces that George V. Warren has returned as Merchandising Manager of the Company with Headquarters in Chicago. Mr. Warren returns to the position with a wide knowledge and experience in the successful merchandising of refrigerators and appliances. Before the last war he was employed for a number of years by City Ice & Fuel in Cleveland where he successfully developed and directed many plans in the merchandising of ice using appliances in that area. Since leaving the company, he has been on the West Coast where through unique merchandising plans he built up a very substantial household appliance business.

Now that plenty of equipment is available, it is the policy of City Products to again actively and aggressively engage in the promotion and sale of all ice using appliances in the various areas in which they now operate. Complete sales organizations and a full line of ice using appliances will be set up in each operating city. Aggressive merchandising and advertising plans are in the making to assist in this sales effort.

Ice Company Asks Dismissal of Charge of Violating Antitrust Law

A MOTION by Samuel R. Morgan and two officials of three ice companies to dismiss charges of violating the Sherman antitrust law was taken under advisement by Judge Benjamin C. Dawkins of the federal district court at Shreveport, La. Judge Dawkins ordered attorneys for Morgan, Mrs. Maude Morgan of the Consumers Ice Co. and Vivian Morgan Ice Co., and Charles E. Elkins of the Louisiana Ice Co. to file briefs in support of the motion to dismiss within 10 days. Government attorneys will have an additional 10 days to make a written reply.

The three ice companies and Morgan are charged in a grand jury indictment with conspiring to destroy and acquire competing manufacturers and distributors selling ice at destructively low prices and by giving away ice until competition was destroyed.

Morgan and officials of the three ice companies state in the motion for dismissal that the government is prosecuting on the strength of evidence given by Morgan before a federal grand jury at Monroe Oct. 18, 1948. Morgan contends that he has been placed in an "unfair" position since he was forced to testify before the grand jury on the basis of his own records and documentary evidence taken from the ice company files.

Grocers See Ice Demonstration

A DEMONSTRATION on how to improve merchandising of fresh fruits and vegetables was presented by the Southwest Ice Co., Altus, Okla., for grocers and their employees, February 8, at the New Orient Hotel banquet room. A buffet supper preceded the demonstration.

The use of crushed ice to protect and glamorize fresh fruits and vegetables in the retail stores was demonstrated in a new ice display case. An interesting part of the program was provided by the showing of "Naturally Yours," the National Association's movie film. The demonstration was conducted by Cooper Andrus, produce specialist of the Southwest Ice Co.

New Combination Ice—Mechanical Refrigerator Offers Appeal to Domestic Trade

A COMBINATION ice and mechanical household refrigerator has been designed and tested by Walter M. McGee of the Peoples Ice Co., Tulsa, Okla., and fellow associates in the ice industry. After working on this idea for several months, Mr. McGee had a model on display at the recent convention of the Oklahoma Association of Ice Industries. At this convention he read a paper on the domestic ice business during which he discussed the adaptability and advantages of this refrigerator to the ice business.

The special equipment which includes a mechanical refrigerating unit and compartments at the top for frozen foods, beverages, crushed ice and the ice chamber, is installed in a standard ice refrigerator cabinet.

8—Ample supply of crystal clear cracked ice, or cubes, for all occasions

9—Balanced humidity throughout the refrigerator except the freezer

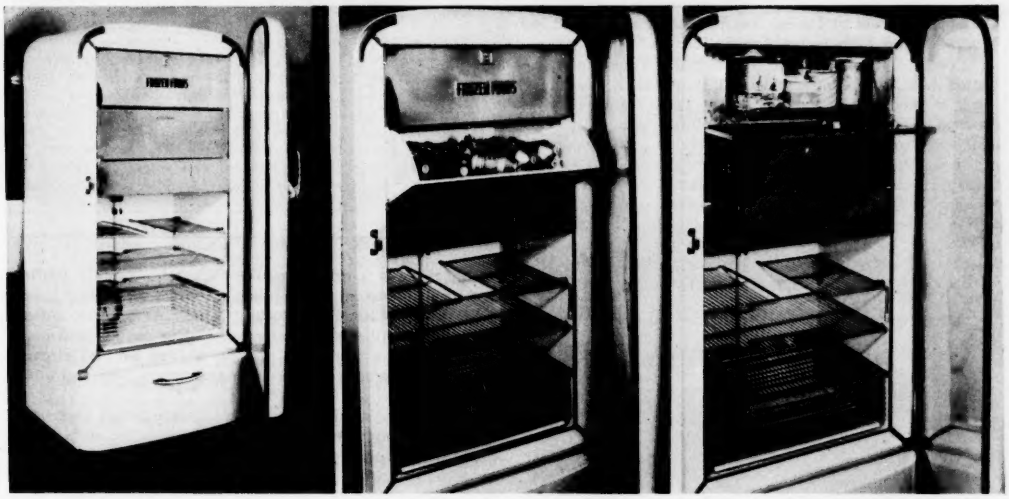
10—50 lbs. frozen food compartment with sub-zero temperature

11—Cooling of bottle or canned goods down to 45 F. within 30 to 40 minutes

12—Cracked ice bed for storing vegetables on ice

13—60 lb. of cracked ice or cubed ice storage space

14—Will be iced from bags only, either canvas or paper. This eliminates any possibility of the refrigerator being marred by the tools of the serviceman.



Interior views of new combination ice and mechanical household refrigerator designed by Walter McGee, Tulsa, Oklahoma, and associates in the ice industry.

This equipment, Mr. McGee says, would appeal to higher income brackets to whom it is becoming more difficult to sell ice refrigerators. Also it will be more convenient to the user and give better and more complete refrigeration than any refrigerator now on the market. Another advantage is that it would tie-in with the popular frozen foods industry and might even result in a combination frozen foods-ice delivery.

Information from Performance Tests

From a number of tests and data obtained from operating conditions, the following information on the performance of this refrigerator is summarized.

1—Freezer temperatures 0 to -8 F.

2—Food compartment temperature 38 to 45 F.

3—Humidity 79 per cent

4—Ice consumption 8 lbs. per day

5—Electric bill $1.20 per month

6—Universal sealed type guaranteed motor

7—Permanently connected drain

15—Can have ice serviceman replenish ice or can pick up bagged ice at nearest ice station or plant.

16—Freezing of desserts and ice cream at will

17—Since the cracked ice of cubes do not stick together same can be removed easily and conveniently

18—Not necessary to make ice cubes

19—No defrosting worries

20—No condensation on the walls or interior of the refrigerator

21—No pans or vessels to empty

22—No covering of foods

23—No mixing of food odors

24—No drying out of foods from dehydration

25—No extra dishes to wash

26—No extra containers to keep clean

27—No hydrators to bother with

28—Overall convenience to housewife heretofore unknown in any refrigerator

29—Can be iced or reiced easily and conveniently by any normal teenager or adult of the family

Merchandising Ice in Gary—Luncheon Attracts Civic Leaders —Food Stores Find Ice is Best

THE Barnes Ice & Coal Co., Gary, Ind., under the direction of B. H. Landing, sales manager, gave a luncheon Tuesday, February 22, for a group of civic leaders at which talks were made and the ice industry film "Naturally Yours" was shown. A total of 63 people responded to the invitation, representing some of the more important educational and civic personages of Gary.

Among those present were presidents of Parent-Teacher groups from the larger schools, heads of the Gary Council of Social Agencies, the Visiting Nurses organization, the Welfare director of the Beta Gamma Upsilon, representatives of the City Health Department, the director of Home Economics of the Gary Schools, the heads of the Health Department of the Gary Schools, the County Agriculture Agent and assistants, produce wholesalers, and three producers of garden produce; Miss Madeline Holland of the Chicago Tribune, Mrs. Floyd Mills, Director of District 3A Indiana Congress of Parent Teacher Associations and Bob Walton of the Indiana Ice Association.

After the luncheon the film "Naturally Yours" was presented and Mr. Landing gave a talk stressing the importance of shopping for quality foods. Talks also were given by Dr. D. M. Harris, Gary Health Officer, on sanitation and care and selection of fruits and vegetables in markets; Dr. Mattie J. Bullard, head of the Health Department of the Gary Schools on diet and health; Miss Ruth Schooler, director of Home Economics in the Schools, on food education in the schools, food values, and the judging of foods in markets.

In the dining room was an 8 foot ice display case filled with fresh fruits and vegetables with plenty of color, and alongside was a dry vegetable rack with rapidly wilting produce. These attracted much attention and many questions were asked. L. E. Cutler, County Agriculture Agent, in particular, displayed much interest in cooling and icing produce in the fields and announced that he had already started programs for such cooling of sweet corn and other vegetables.

Commenting on this meeting Mr. Landing says they hope to follow through with this educational program until every home in the territory has been told the story of foods kept garden-fresh with ice. He said the advertising of the National Association of Ice Industries, for the past few years has been of an exceptionally high quality and the Research Department has been doing some very fine work in getting definite facts and information to ice producers that has been very helpful in their sales work.

"Yet," he continued, "with all this we have thought for some time that the public as a whole was merely sitting back and saying, 'Well what about it?' In other words the public and all too many ice men are adopting a passive acquiescent attitude that can never produce action or results. So the Barnes Ice and Coal Company decided to do something about it.

"We knew that to break down this passive attitude we had to reach people that were in a position to help do something about it, so we started with this in mind. We checked and rechecked the people in the city and county that were active in civic programs and were relatively close to the entire public. Our reason for this was to have these leaders take back the message to the various groups they were actively working with and this in turn would broadcast our message to many more people than we could ever reach in a short time.

"The selection of these leaders took a lot of time as we contacted each one in person and told them what the meeting was about. With them to back us up we are sure our story will be told sincerely and honestly."

Apartment Dwellers Like Iced Vegetables

One of the successful fruit and vegetable stores in Gary, Ind., is at 1220 W. Fifth St., operated by Oliveri Bros. This store is located in the heart of the apartment district and customers are discriminating buyers. According to Miss Clare Oliveri, since their produce is protected with ice it is always in prime condition and this greatly increases their sales. Since they offer a variety of produce they can arrange for eye appeal as shown in the above picture and this catches the discriminating shopper.

Sea Food Store Uses Ice

The Florida Seafoods store at 1226 West 5th St., Gary, Ind., uses ice to keep its products in perfect condition. This store is operated by brothers, Mike and Irene Koulianos. They specialize in fine quality seafoods which may be ordered cooked or taken out uncooked. In the display shown above, there are spanish mackerel, red snapper, shrimp, oysters, scallops, frog legs, sea perch and other types of sea food. In back of the grille is a 6 x 8 walk-in cooler and large sized storage chests filled with these fine foods packed in ice. Mr. Koulianos says that without ice, they simply could not operate. With it they keep their foods in A-1 shape and on display so that customer can see just what he is buying.

One-Man Ice Plants Produce Low-Cost Ice

By J. A. Etter
Frick Company Branch Office, Cincinnati, Ohio

ON February 20, 1945, the Polar Ice & Fuel Co. put into operation at Indianapolis the first of a remarkable series of one-man ice making systems. This installation, known as the "Merchants" plant, has now been producing 42 tons of ice daily for more than 1350 consecutive days, using one man, working only one shift, to care for everything in the tank and machine rooms.

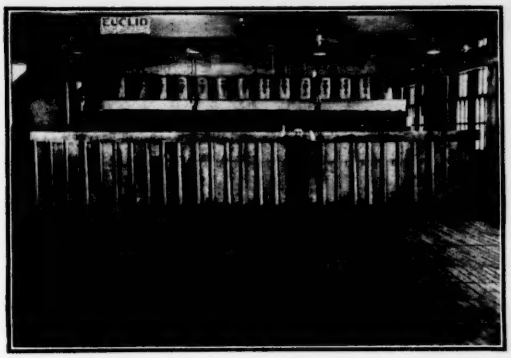


Fig. 1—All records for ice produced by one man have been broken at the Merchants Plant, Indianapolis.

The extraordinary success of this plant, which has been widely discussed in both conventions and magazines, has since led to the construction of five other plants built along similar lines, but making up to 108 tons of ice. All these plants are in the Hoosier State. A seventh one-man ice-making system, to produce 100 tons daily, is shortly to be built at El Paso, Texas.

The new plant of the Muncie (Ind.) Ice & Coal Co. was the second of the one-man systems to be finished. It makes 46.7 tons of ice per day. A full row of 26 cans is lifted in a grid, and is thawed and dumped on equipment that has been elevated enough for the ice to slide by gravity into the scoring machine after leaving the main conveyor. The scoring machine is in a space partitioned off from the ice storage room, and receives the overflow water from the dip tank as a means of melting the snow from the saws.

As in most of these plants, the water at Muncie is treated to soften it, and is agitated by medium-pressure air from tubes in the corners of the cans. Unlike the other plants of this kind, the one at Muncie uses a large evaporative condenser. Otherwise it would have to draw from a number of wells at more or less distant locations. The plant has a Frick 8 by 8 compressor driven by a 60-hp. motor, and a 9 by 9 machine of the same make driven through V-belts by a 75-hp. motor.

The Zero plant of the Polar Ice & Fuel Co. is located at 27th and Cornell Streets, in Indianapolis. The tank here is 25 cans wide and 28 long; daily capacity is 52.5 tons. Brine coolers used in the former absorption plant are installed at opposite ends of the tank.

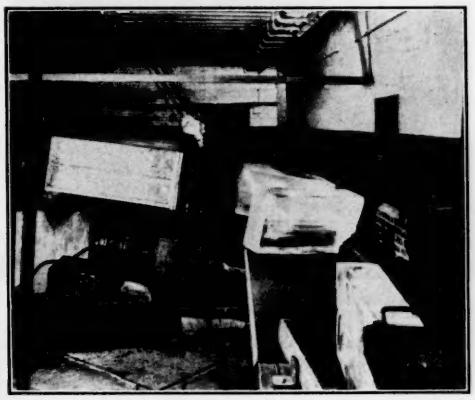


Fig. 2—Can fillers, dump, ice, conveyor and scoring machine at Muncie.

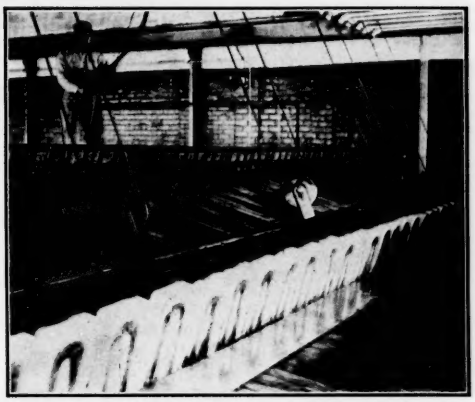


Fig. 3—Ice ready to slide on to conveyor.

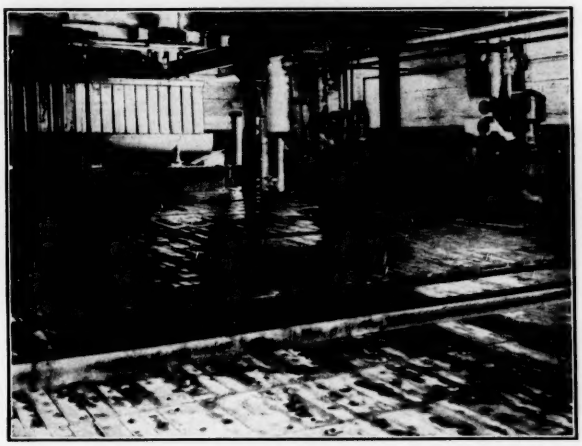


Fig. 4—Machines and tank all on same level at Muncie plant.

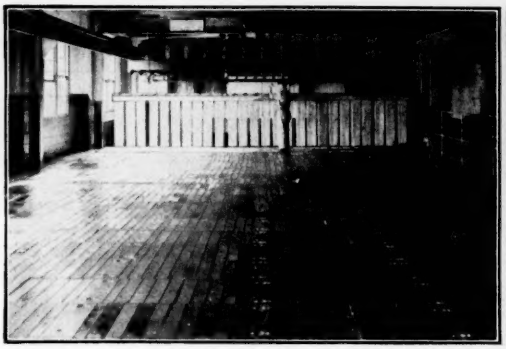


Fig. 5—One-man ice making system at Columbus, Ind.

Fig. 7—The tank at New Albany has 956 cans, 26 of which are lifted at a time.

After the conveyor carries the ice away from the dump, the direction of travel is reversed by an ingenious arrangement of slides. The scoring machine is placed in a space normally wasted, immediately behind the conveyor.

This plant has now operated three seasons. It has two rebuilt ammonia compressors, size 10 by 10, each run by a 75-hp. motor. Adjoining the new ice-making system is a small 20-ton plant, complete with its own compressor, lately moved over from Rushville, Ind., and used in rush seasons only.

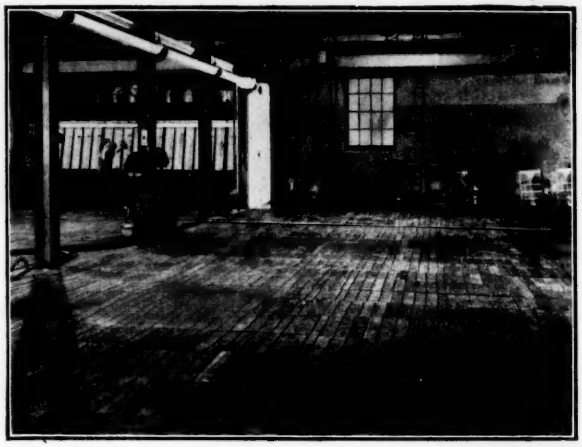


Fig. 6—Two tanks, with cross-over crane arrangement, permit using one set of harvesting equipment at South Bend.

New Albany Plant

At New Albany, across from Louisville, near the falls of the Ohio River, we find the 70.2 ton plant of the Polar Ice & Fuel Co. This has an ample supply of cold well water at 56 F. and operates at a head pressure of only 127 lb. in the summer. To take further advantage of its low temperature, some of this water is piped through the bottom of the ammonia receiver, which is of the shell-and-tube type; the liquid ammonia is cooled to 60 or 65 F.

The tank here is 26 cans wide and 36 long. The ice is actually harvested in eight hours. Operations were started early in June of 1948. Karmen Shelton is the engineer.

Four ammonia compressors, driven by motors totaling 210 horsepower, carry the load. A 30-hp. motor drives the Pennsylvania air compressor. The air is lowered from 40 to 17 lb. pressure before entering the cans, and is cooled to 25 F.

This plant occupies the building of a former brewery, started nearly 75 years ago. New Albany is a city of 40,000 people and is a center for the plywood industry.

At Columbus, the Serv-Ice & Coal Co. has modernized its former plant and is now making 62.3 tons of ice with the one-man system. Full-row lift is used on a tank which is 26 cans wide by 32 long. The cooling load is carried by a new Frick 9 by 9 and three old compressors of another make. Cooling water is drawn from a well, a quarter of a mile away, which supplies 350 gallons per minute. After being dehydrated, the air is furnished to the laterals at 17 lb. pressure. Harry Clark is engineer at this plant, which started operations about June 1, 1948.

The company has its own delivery system, and draws ice in part from a big season storage holding 2000 tons.

The South Bend Brewing Co. has two ice-making tanks, each 24 cans wide and 30 long. The two Sheppard cranes are designed with a cross-over at the dump end of the ways, making it possible to use only one dip tank and one dmp board, for harvesting both tanks, and to place the scoring machine behind the dip tank. One set of can fillers also serves both tanks.

(Continued on page 62)

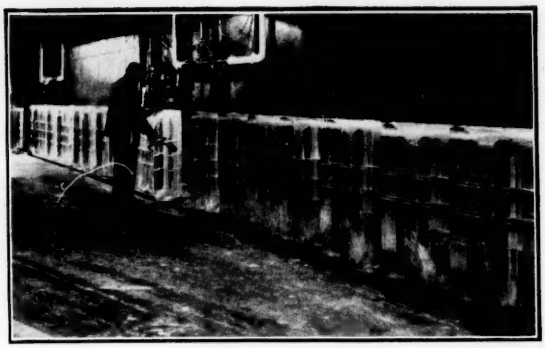


Fig. 8—The South Bend plant, like the others, is proud of the quality of its ice.

Reports From Unit Ice Associations

Missouri Ice Manufacturers Association, Annual Meeting

THE 24th annual convention of the Missouri Ice Manufacturers' Association was held at the Hotel President, Kansas City, Mo., February 2-4, 1949. Expressions of members and exhibitors indicate that this was one of the best meetings ever held by the Missouri Association. Harold Margolin was chairman of the Entertainment Committee. The dinner dance held Thursday evening, February 3, was followed by an outstanding floor show.

In his annual report, President J. R. Dean said the Missouri Association, along with the National Association of Ice Industries is doing a splendid job of fulfilling the ideas of the ice men who founded these associations. That they were on the right track he said is shown by the fact that the business has continued to grow in spite of drastic and seemingly overwhelming competition.

H. H. Mobely, director of the Missouri Division of Resources and Development spoke of the great land and mineral resources of America and particularly of the State of Missouri. Missouri also has a great asset in its scenery and recreational facilities and it was for the promotion of this growing vacation business that the Department which he represented had been established.

John H. Glenn of The Glenn Ice & Fuel Co., Beardstown, Ill. gave an interesting and practical talk on merchandising. Mr. Glenn described the merchandising plans essential to a modern ice business which, he said, should include modernizing ice plants, installation of labor saving devices and methods, and streamlining the appearance of delivery equipment. Mr. Glenn said he had made great progress in the merchandising of ice by working with the beverage industry and fresh produce growers. Although the beverage dealers are much further advanced in the use of ice, much progress is being made with the produce dealers. They also are working with local fresh fish dealers and poultry growers.

Guy W. Jacobs, Director of the Department of Public Relations, National Association of Ice Industries gave a report on National Public Relations activities. The advertising program of 1948, he said, ranked with the best of the top-notch publicity programs of the year and the 1949 program will be better, broader in scope, more dramatic and should be more effective in helping individual members in local markets.

Mr. Jacobs then showed a panel presentation of the program, an adaptation of the one shown at the National Convention last fall. He then reviewed briefly some of the activities of the program including the educational work, telling how to put on an iced produce demonstration, the ice film, "Naturally Yours," newspaper mats, billboard posters and magazine advertising.

Regarding finances, he said that in spite of getting off to a late start, and of not yet having enough money to guarantee the campaign, all reports indicate that it will be supported as well or better than last year.

Merchandising Session

At the Merchandising session Thursday morning, Fred E. Kunkle of the City Ice Delivery Co., Wichita, Kans., talked on his experiences in merchandising packaged ice. Mr. Kunkle said he was thoroughly convinced that packaged ice can be made a profitable business and that it will create a very desirable new market for ice, although at present, it is only a small part of their sized ice business. The big sized ice tonnage is in the commercial field and they are handling this with canvas crushed ice bags.

When they first entered the sized ice business, he said, their first step was to build a processing room 26 x 40 feet, but early last year they enlarged it by adding another 25 ft. so now they have a room 26 x 65 ft. He suggested that anyone entering this business should build a processing room at least twice as large as they think it should be, thus providing for future expansion. He then described the equipment and processing details which provided for crushing, sizing, washing and packaging. There are three sales outlets; by delivery; through food market and drug stores; through vending stations. They try to keep from delivery service as much as possible since such service requires special delivery which is expensive. They make a delivery charge of ten cents per bag with a maximum delivery charge of 35 cents regardless of the size of the order.

Officers and Directors for 1949

President, James R. Dean, Cape Girardeau, Mo.
Honorary President, J. L. Rowland, Fayette, Mo.
Vice-President, Harold Margolin, Kansas City, Mo.
Secretary-treasurer, V. A. Esphorst, St. Louis, Mo.
Directors: James E. Campbell, Joplin; Harry Jacobs, Salisbury; Ben Welcher, Poplar Bluffs; M. J. Garvey, Jr., St. Joseph; Alvin D. Hatten, Independence; R. C. Muckerman, St. Louis.

Selling Appliances

Don Lock, Ice Refrigerator and Electric Appliance Co., Chicago, presented a discussion on the selling of ice-using appliances. The need for selling, he said, was thrust upon the ice industry with the advent and increased competition offered by mechanically refrigerated cabinets. The ensuing sales efforts, he recalled, greatly strengthened the ice industry and now it is in a favorable position to plan for a successful conduct of its business during the present and the future.

He pointed out that merchandising is not only selling something but, to the ice man, it should mean inducing the public to like the company and the products it sells, to buy and use those products which should be available in the form wanted and when wanted. Merchandising is particularly important now, he said, when the days of easy money and free spending are fading into the past.

At the luncheon session Thursday noon, Robert L. Burnes, sports editor of the St. Louis Globe Democrat gave an interesting talk on "The Dangerous Side of Sports."

Richard C. Muckerman of the City Products Corp., St. Louis, discussed over-all conditions in the ice industry. The industry, he said, came out of World War II with greater tonnage and greater markets, with more uses for its products than it had ever had before. This market condition is certainly advantageous but unless the ice men capitalize on their opportunities and do it now, they will be in the same position they were when they first allowed mechanical competition to make inroads on their domestic market. To get out of this market what they should get,

he said, they would have to supply all sizes of ice in the form demanded by customers. The program should include, also, plant modernizing, training of employees, advertising, and all other modern methods of merchandising.

M. J. Garvey, Jr., president of the National Association of Ice Industries speaking on "Meeting the Challenge," said the most important question in the ice industry today is the future security of the business and what is best to do about it. He pointed out that a prosperous growing business must have a secure foundation of modern equipment and along with this provide prompt and efficient service with the kind of ice that people want, in the way they want, and when they want it. Mr. Garvey also touched on the organization and the work of the National Association of Ice Industries, pointing out that it provides a balance wheel and a source of information in Washington that helps keep the ice industry established as one of the important growing industries of the country.

Sgt. Robert E. Davis of the Missouri State Highway Patrol gave an interesting talk on truck safety. After showing a safety film, "Horizons Unlimited," he said that the average driver of a truck is a better driver on the road today than any passenger car driver and the reason is that the trucking industry has been awake for some years to the need for training drivers in safety and have done something about it.

National Ice Marketing Institute

A report on the National Ice Marketing Institute organized for training of ice company personnel by the National Association of Ice Industries was made by three Missouri ice men who recently graduated from this training course.

Elmer Goebel said that after finishing the course he felt that he had learned more than he thought possible about training of employees and that those who put this training into practice will get worthwhile results.

V. A. Esphorst, secretary of the Missouri Association discussed briefly the instructors of the National Ice Marketing Institute and the organization of the course. No matter how long any man has been in the ice business, he said, he would learn something of value from this course and he recommended that every ice plant manager go himself and take this training.

C. W. Avis said that if at all possible all ice plant managers should attend this course or have a member of his personnel do so.

Closing this part of the program, Dan Prager, director of the Personnel Marketing Department, National Association of Ice Industries, read a paper, "Planned Selling Pays Off." Mr. Prager said that many capable business men with real money invested in the ice business have stated they believe that the ice industry is on the threshhold of a period of expansion and prosperity unequaled in its history. But this is probable only if top management has the alertness and vision to make the necessary readjustments in thinking, marketing and distribution, to take full advantage of the opportunities that exist, to establish and maintain new outlets for ice.

To maintain safe tonnage levels increased sales of ice, he said, must come from markets that have not, as yet, been developed. One of these is the sale of auxiliary ice to mechanical owners. Finding and capitalizing upon such new markets will require planned selling, will demand well trained sales and service personnel, and will require leadership of the highest order. The only effective approach to achieving this necessary objective, he said, is through the training of the sales and delivery personnel from top management down. This training, he said is provided through the National Ice Marketing Institute.

Ohio Association of Ice Industries, 1949 Meeting

THE 1949 convention of the Ohio Association of Ice Industries presented the results of steady work in the various lines of activity. This 31st annual meeting was held in Columbus, Ohio, on February 28 and March 1.

Through the Ohio Association a coordinated program of accident prevention has been carried on in cooperation with the State Division of Safety and Hygiene. The results obtained were quite evident in the report presented to the convention by Gilbert Bush, chairman of the Safety Committee with the assistance of Robert Smith, committee member and former chairman.

It was announced that the 1949 rate for compensation insurance is 99 cents per 100 dollars of payroll. This is less than one-fourth of the rate paid in the highest classification when the program was set up some ten years ago. Last year the Ohio Ice Industry paid total premiums of 204 thousand dollars on a payroll just under 18 million dollars. Experience has shown that where no real work is done to prevent injuries to workers, accidents usually cost twice as much as they should. For this reason it is quite conservative to estimate that the Ohio Ice Industry saved over 200 thousand dollars in compensation premiums last year through its group effort. Undoubtedly this work places the industry on a much better basis for the competitive days ahead.

It was reported that 88 companies engaged in the 1948 safety contest and the total number of injuries was reduced to 50 per cent of the 1947 frequency. There were no fatal or permanent disability injuries and 61 companies had no reportable injuries during the year. Recognition was given to employees who completed three, five and ten years of work with no accidents. The placques awarded to the winners in the three divisions of the 1948 contest were presented to The City Ice & Fuel Co., Dayton; Car Icing Station of the City Ice & Fuel, Columbus; and Lorain Crystal Ice Co., Lorain.

Ohio Association of Ice Industries
Officers and Directors

President, Harold J. Rolph, Ironton.
Vice-President, J. H. Glass, Middletown.
Secretary-treasurer, Guy W. Jacobs, Steubenville.

Directors: Frank H. Holters, Columbus; Harold J. Rolph, Ironton; Harry J. Thoma, Mansfield; H. J. Book, Barberton; J. L. Glass, Middletown; Wm. C. Ludwig, Toledo; John P. Kocak, Lorain; Stuart Muenter, Tiffin; Jos. W. Smith, Columbus; Karl Beachy, Toledo.

Sales Opportunities

Some of the excellent opportunities offered in the icing of produce were discussed by Dr. Chas. W. Hauck of Ohio State University, an expert in marketing methods who directed a project supported by the Ohio group during the past year. He declared that perishables have not been properly protected in distribution channels and as a result losses of from 20 to 25 per cent have been sustained in some items. Products grown in distant areas have been given

better refrigeration protection than those grown locally and it is necessary to apply the same methods to Ohio products if they are to compete on the best basis.

There are specific problems, however, in bringing about this better handling. For instance consumers will have to be educated because on some commodities they showed preference for produce displayed in non-iced cases although it is true that for other commodities they prefer the ice protection. Buyers for stores also showed a lack of enthusiasm for some ice protected commodities offered in wholesale markets. The reason they gave was, in the past ice has been used as a partial restorative on depreciated produce.

None of these appeared to be limiting factors because it seemed evident that better education of consumer and wholesale buyers will convince them of the desirability of proper ice protection. Dr. Hauck reported that average spoilage losses of 7 per cent had been reduced to zero with ice protection so that an educational job would appear to have an excellent basis for success. The report of the 1948 investigation will be ready for publication shortly.

Report on Results

An encouraging and inspiring report of results obtained in promoting and selling iced vegetable displays was given by Dr. Fisher, Akron. He emphasized that ice-using merchandise can be sold and urged all his listeners to carry the convention enthusiasm back home to keep it working throughout the year. It is especially necessary, he said, to fulfill the promises and the progressive outlook of the National advertising but, he cautioned against expecting these "ads" to do the whole selling job.

The man who establishes his success in selling equipment to grocers must take the time and trouble to understand the grocers' problems thoroughly. Mr. Fisher gave details of what such understanding implies as well as the results it can obtain. The grocer or produce dealer, he said, considers the ice man a nuisance until he understands what ice refrigeration can accomplish to increase volume and profits. It was recommended that salesmen utilize completely set-up models of ice display cases to show the equipment and demonstrate its use to prevent shrinkage and lost sales. Excellent examples were also given of the manner in which the grocers' customers can be used to aid in convincing him that his produce should have a better and more effective protection which ice supplies. The reports of the numerous sales resulting from the described methods showed how effective they have proved to be.

Merchandising in Small Community

What well-coordinated ice and appliance merchandising will do in a small community was recounted enthusiastically by John H. Glenn, president, Glenn Ice & Fuel Co., Beardstown, Ill. Referring to the successful merchandising carried on by many companies during the early 30's, Mr. Glenn took his listeners to task for not adopting even more vigorous methods at the present time when they are enjoying much greater sales volume and should be working to protect it. In addition to complete merchandising, he declared, it is essential to follow the best methods of ice production and low-cost handling in order to remain competitive.

Encouraging reports were given by Mr. Glenn of cooperative work with beverage bottlers and other users of ice to increase their consumption. He cautioned that it is necessary to find out what type of service is desired by the customers and to furnish it to them. He recounted the many reasons ice men give for their inertia and lack of interest in real selling but declared that none of these should prevent the setting up of an effective program and following it through.

General Operations

Special emphasis was placed on proper plant operation. Chairman Wm. Ludwig of the Technical and Engineering Committee gave an outline of the committee projects to point up plant operation. He described efforts to provide for training of plant engineers but said that a program attractive to the industry had not, as yet, been effected. Sanitation requirements, especially in the preparation of and handling of cubed and sized ice were discussed and he declared that nothing less than absolute sanitation can be permitted. Mr. Ludwig also gave suggestions for safety in ice plant equipment. Essentials he detailed were high pressure cutouts on compressors, provisions to cut off power to compressors from outside the machine room, the tagging and marking of all valves, safe charging connections and methods and proper installation and maintenance of relief valves.

The fundamentals of efficient ice production were discussed by Emerson Brandt, ICE AND REFRIGERATION. He emphasized the providing of necessary thermometers, gauges and instruments so that the engineer can determine how well the various sections of the plant are operating. Examples were given to show the savings thus obtained in operating costs and how much better production can be accomplished.

Report from National Association

The work of the National Association on proposed wage and hour legislation was described by Mount Taylor, executive secretary. He told how many ice men have come to Washington to work with their congressional representatives on modification of the costly provisions of the proposed legislation. Mr. Taylor declared that this could be a severe blow to industry profits and at the same time could lead to inflation of a serious nature. He expressed surprise at the lack of interest existing in this legislation by many men in the industry. The provisions of the bill and their probable effects were detailed by Mr. Taylor. He analyzed the past trend of the industry's operations and discussed the probable developments of the future. The industry, he said, should not be lulled by any false sense of security during recent non-competitive years but should place every department of its operations on the best basis for the struggle ahead.

President Karl Beachy and Guy Jacobs, secretary-treasurer, of the Ohio Association, gave excellent reports of their work and the progress during the year just concluded. A placque as recognition of his services to the Association was presented to Earl Humes who served as president during 1947.

The National advertising program including what it had accomplished in 1948 and the plans for the future were presented by W. R. Snead, state chairman of that department, who urged complete support for the program during the present year.

The research program was reviewed by Walter Blessman, chairman of that committee, who described the excellent results obtained in investigations during the past three years. He urged thorough study and complete use of the valuable data already obtained as well as that which is expected from future work.

Wm. A. Neher, chairman of the merchandising committee, stressed the need for a better organization of merchandising efforts throughout the State. This in turn should be coordinated with National merchandising and promotional work to obtain the best cumulative results. One of the first steps, he suggested, was the establishment of regular state and district meetings on merchandising.

New Market for Ice Described To Michigan Association

MEMBERS of the ice industry of Michigan were told that there is an important field for applying ice to Michigan agricultural products. This good news was one of the features of the 32nd annual convention of the Michigan Ice Industries Association held in Jackson on March 3-4. The program of the convention included discussions of merchandising opportunities, plant and production methods and general operations.

The story on pre-cooling and refrigerated shipments of Michigan products was presented by H. A. Cardinell, Department of Horticulture, Michigan State College. It was not a new activity for Dr. Cardinell to show members of the ice industry where potential markets exist. For a number of years he has conducted investigations to develop proper refrigeration procedures for agricultural products and last year he described the initial work with the Stericooler. This cooler is an outgrowth of the hydrocooler which had been in use for some years on the west coast for the rapid pre-cooling of produce. A product of the Food Machinery Corp., it had limited application the previous year in Michigan as reported by Dr. Cardinell.

The Stericooler chills baskets or boxes of produce rapidly in a cold water spray. The water is chilled by finely crushed ice and the circulating water is treated with Hypo-Color, a chemical which retards the growth of bacteria and fungi which cause decay in harvested products. The use of this equipment on peaches during the 1948 season showed excellent results Dr. Cardinell reported.

Costs and Profits

The overall cost of the process was 15 or 16 cents per bushel while the Stericooled peaches sold at a premium of 50 cents per bushel over those handled in the ordinary way. An average of 18 lbs. of ice was consumed per bushel and the unit costs were 6 cents per bushel for ice, one cent for power and labor and 8 cents for the machine, chemical and service. By proper pre-cooling and handling, it was shown that Michigan peaches can establish an excellent market at many distant points in addition to the somewhat restricted local markets which are available to peaches handled in the ordinary way. Also the peaches which were Stericooled and properly refrigerated can be harvested closer to maturity when they have a better flavor and appearance. This brings wider consumer acceptance which should return higher profits to Michigan growers and extend the season and volume of sales. In turn, it would provide an excellent additional market for ice.

Certain problems will have to be solved before the potential benefits are realized but the methods of solution are readily apparent. For instance experienced wholesale buyers are cautious about purchasing wet or damp peaches. Under marketing conditions existing in the past, wet peaches spoil more readily. It has been rather well demonstrated this spoilage occurred because the peaches were not properly cooled and also that sterilizing greatly reduced the tendency to spoilage. More education of the buyers is needed on these points but when Stericooled peaches were advertised in the produce journal many orders resulted. Also long distance shipments of the peaches arrived in excellent condition and uniformly good reports were received from the buyers.

The handling of the ice is also a problem because during this initial period, proper facilities have not been established to unload the ice and apply it to the process. This, of course, can be solved and also Dr. Cardinell indicated the system has application for many other products such as celery and asparagus which are grown in volume in the state. The peak production seasons of these various commodities occurs at different times so that the load factor on the ice and equipment is extended over a longer time.

Officers and Directors
Michigan Ice Industries Association

President, Hiram Collins, Grand Rapids.
First Vice-president, Walter Hintz, Detroit.
Second Vice-president, Joseph Oderman, Detroit.
Secretary-treasurer, Wm. Campbell, Belding.

Directors: Ollie Webber, Flint; Bert Blackmer, Muskegon; Raymond Green, Rochester; George Steers, Kalamazoo; Leonard Borin, Detroit.

Ice Marketing Institute

The results being accomplished by the National Ice Marketing Institute were described by George Steers, Kalamazoo, and supplemented by two men who had recently graduated. Mr. Steers told how much material had been developed for use in sales training but it had not brought full value because there was limited ability in the field to apply it properly. The Institute was set up to train men in using sales material so that they, in turn, could conduct schools for service men in the field. Excellent reports have been received on the value of the Institute's course. Mr. Steers introduced Robert Pitchford, Lansing Ice & Fuel Co., Lansing, and Orville Alleman, Brown Ice & Coal Co., Benton Harbor, who recounted their experience at the Institute and told what value they had received from the training.

The National Ice Advertising program was presented by Guy Jacobs, director of the department, for the National Association of Ice Industries. In the sound film, he presented the results of the 1948 campaign and what is planned for the future. The value of the various services was described and Mr. Jacobs urged continued use of all of them.

The inspiring message on ice merchandising which John Glenn of Beardtown, Ill., has presented to a number of industry groups was enjoyed by the attendants at this convention.

A method for supporting enlarged merchandising and advertising was suggested by P. E. Bunker, Auto Owners Insurance Co., Lansing, Mich. Mr. Bunker who directs the accident prevention department for his company suggested that the industry awaken to its opportunity in safety work and save money through reduction of accidents.

Production and Plant Operation

Good methods of ice production and plant operation were discussed by Emerson Brandt, ICE AND REFRIGERATION. He described the numerous factors in efficient plant operation and cautioned against attempting to simplify operations too much. While ice can be made by regulating a few valves and operating several units of equipment, he said that producing good ice at lowest cost involves complete understanding of all plant processes and continual checking to insure that the best operation is being maintained. Methods of checking were given and the results to be obtained were shown by examples from actual operations.

The Practical Refrigerating Engineer

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OPERATING • MAINTENANCE • NEWS
QUESTIONS AND ANSWERS

National Association Practical Refrigerating Engineers

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GEORGE KOEHNE
Tulsa, Okla.

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EMERSON A. BRANDT

Executive Offices:
435 North Waller Ave.
Chicago 44, Ill.

Refrigeration in The Dairy Plant

By Bert McKenna

Chief Engineer, Golden State Company, Ltd., San Francisco

THE average profit on a quart of milk is less than a quarter of a cent a quart, or about one per cent of the cost, so efficiency in the milk business is of first importance. A few mistakes or an operation that is temporarily inefficient can put a milk company operating on this small margin of profit from the black to the red side of the ledger. Because of this it is particularly important that refrigerating operations be the most efficient possible.

In order to deliver to the consumer the best possible container of milk, it is necessary that the processing plant receive a good grade of raw milk from the producer, and it's also necessary that the engineer work with the field department personnel to advise the producers how to cool and preserve the milk until it is delivered to the processing plant. Milk should be cooled to a temperature not higher than 40 F. and held there until delivery is made to the transportation truck.

Refrigeration during transportation is the next problem for the engineer to work on. I have some figures to show just how important good insulated tank trucks are in comparison with carrying milk in cans on open trucks.

This test shows that 2200 gallons of milk, loaded at a temperature of 40 F. in an insulated tank truck lost less than two degrees in twelve hours' time.

By comparison, milk carried in ten gallons cans on an open truck with an elapsed time of only six hours lost as much as 15 degrees. This brings the milk to a temperature where the bacteria multiply very fast. The following figures plated by our laboratory tell us the story of bacteria growth on samples taken from a can of milk arriving at the process plant at 55 F. and left standing at atmospheric temperature:

	Time	Degrees F.	Bacteria Count	Time Elapsed Hrs.
Sample No. 1 Gr. A Raw Milk	10:00 A.M.	55	10,000	0
Sample No. 2 Gr. A Raw Milk	11:00 A.M.	60	18,000	1
Sample N. 3 Gr. A Raw Milk	12: Noon	62	21,000	2
Sample No. 4 Gr. A Raw Milk	1:00 P.M.	65	67,000	3
Sample No. 5 Gr. A Raw Milk	3:00 P.M.	70	400,000	5
Sample No. 6 Gr. A Raw Milk	4:00 P.M.	72	600,000	6

It should be noted that on the fourth sample taken with the three hour time lapse, the bacteria count had gone above the 50,000 count allowed by most health departments for Grade A Raw Milk entering the processing plant.

Dollar Value

Here is where the cost factor enters the picture in a way which can result in sizeable losses. A loading of 2200 gallons of milk has been mentioned and can be used as an example. The 2200 gallons is equivalent to 18,920 pounds of milk. If the milk has a four per cent butterfat content, it contains 756.8 pounds of butterfat. At $1.52 cents a pound, this Grade A Raw Milk is worth $1150.33. If the bacteria count increases to the point where the milk has to be classified as Grade B milk, its value per pound drops to $1.01 cents and the total value is reduced to $764.36.

This makes a net loss on the one load of milk of $385.97, and it shows very clearly why the role the refrigeration engineer plays in this operation is so important.

Refrigeration Methods

In most processing plants milk is allowed to stand in holding vats for several hours before processing is completed. The above tests prove that to keep down the bacteria growth, it is necessary to cool milk as soon as it arrives at the plant, if the temperature has been allowed to rise above 50 degrees.

Now assume that we have a plant equipped with uninsulated holding tanks, both with no means of pre-cooling or cooling vats, and our milk supply is coming in at a temperature of 50 to 55 F., we have a problem. For the purpose of illustration we will say this plant has a capacity of 125,000 pounds of milk per day and a bottling capacity of 20,000 pounds per hour. At this rate we would have some of our raw milk standing at undesirable temperatures with results comparable to the tests we have just shown.

A program must be started to correct this situation. First, the

Presented to the 39th National Convention, NAPRE.

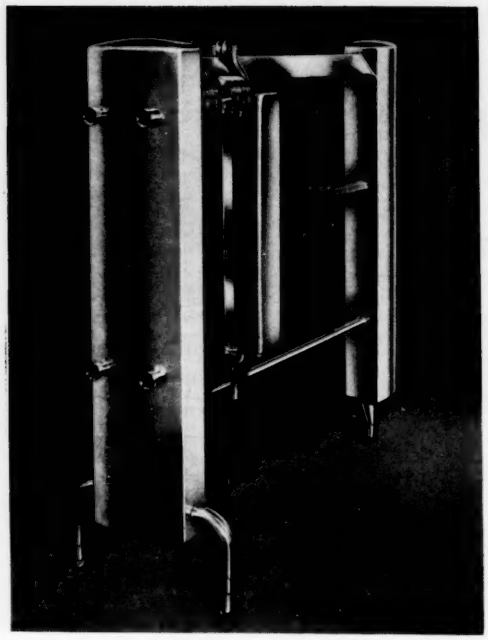


Fig. 1—A plate type heat exchanger of the type used for cooling milk as received. The cooling medium is water and the equipment is constructed of stainless steel. —Creamery Package Mfg. Co. Photo.

tanks must be insulated and if possible, refrigeration coils installed. If there are several tanks involved the price of installing coils in tanks may be prohibitive. In this case pre-cooling before entering the tanks may be the answer.

If there is chilled water available, I would recommend a plate type cooler. If this is not possible, then a horizontal wing type full flooded ammonia milk cooler can be used. In plants having chilled water units with processing time running different from the receiving time, this cooling equipment can be used for the two functions.

Pasteurizing Methods

In plants using the high temperature short time pasteurizing system, the pre-cooled milk is a great help to the refrigeration system on peak loads due to the regeneration effects of this system.

If at times I appear to favor some particular brand of equipment, it is only because my experience has been with this brand and because of company standardization. In most competitive equipment, so far as I can see, there is a great deal of similarity in design and operation. The engineer should pick the equipment to suit his purpose.

The trend seems to be going to short time high temperature equipment in the milk industry. This plate regenerative system has many advantages over the old open vat system. By using a shell and tube sweet water cooler, with water at 33 F. and raw milk at 40 F., it is possible to have milk coming off the pasteurizer at 36 F.

Water Cooling Equipment

In buying a sweet water cooler I find it wise to select a unit greater in capacity than recommended by most sales engineers. Then the cooler operates on a smaller temperature difference cutting down the possibility of freeze-ups. It also gives some room for plant expansion. This latter reason is important since in most plants new equipment is being installed continually.

In the field of controls for sweet water coolers we have selected a dual Back Pressure Control Valve having a magnetic action to cut in or out the back pressure difference in the unit as temperature change in water is needed.

There are many ways this control can be set up to operate. The primary pressure is set at 48½ to 49 pounds gauge pressure or just above the water freezing point. The secondary pressure is set to hold water at 33F., the pressure depending on size of unit compared to load or temperature difference.

One example of this operation is to wire the magnetic action to the flow Diversion Valve on the plate short time

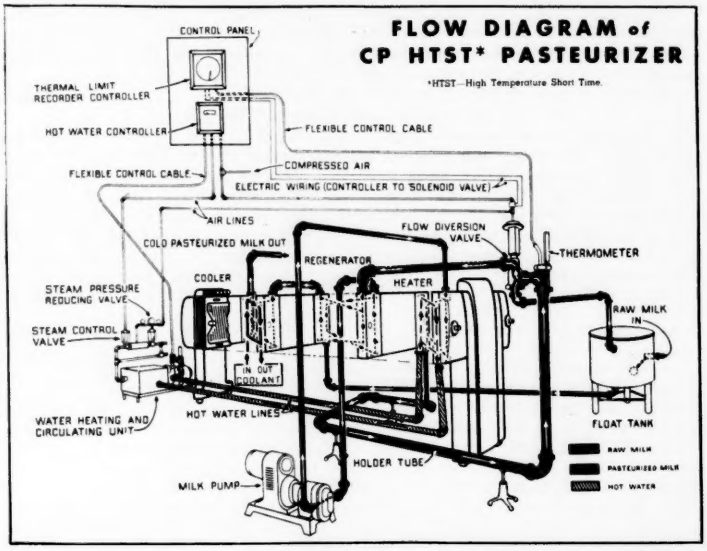


Fig. 2—The operation of the high temperature short time pasteurizer is illustrated in detail. The heater section is at the right, regenerator or milk to milk heat exchanger at the center, and the cooling section at the left. The flow diversion valve at the upper right controls the operation to pass the milk back for another cycle through the heater until pasteurizing temperature is reached. Then this temperature controlled valve allows the pasteurized milk to pass on to the regenerator section. —Creamery Package Mfg. Co. Photo.

high temperature pasteurizer. When Diversion Valve diverts the milk and no chilled water is needed, the Back Pressure converts to the primary side and pressure rises to 48½ to 49 lbs. thus cutting off any chance of the unit freezing up.

When milk flow goes back to normal, back pressure drops to secondary pressure or low side.

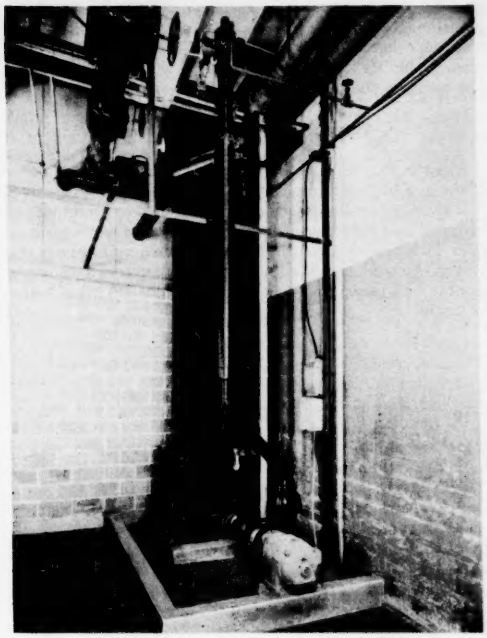


Fig. 3—The vertical shell-and-tube water cooler in the plant of the Golden State Co. at San Francisco. Rated at 105 tons refrigeration, the 36 in. shell has 130—2 in. tubes 12 ft. long and occupies 16 sq. ft. of floor space. The shell cooler was made by Henry Vogt Machine Co. The design and assembly by Creamery Package Mfg. Co.

By the use of a selector switch, you can wire this Dual Back Pressure Valve up in order to use chilled water on many pieces of equipment—activating the valve from the load side of the equipment pump or agitator so when the load drops off, the back pressure rises to primary side 48½ to 49 pounds gauge.

The reason for the low pressure on the primary side or the 48½ to 49 pound gauge with a temperature of 33 degrees plus, is first, to have all water lines full of water with a temperature as low as possible without freezing unit, and second, to eliminate the large pressure drop in unit, causing erratic boiling of ammonia and carrying over to the compressor.

If plate type equipment is used for cooling milk by means of chilled water, a pressure relief valve will be needed in the water line. Consult equipment specifications for maximum pressure. In construction of a plant, it may be necessary to place the chilled water unit and equipment using chilled water an extreme distance apart. It would be well to install a relief valve next to this unit with discharge tied into water return so as to act as a by-pass pressure control, keeping chilled water next to unit when it is needed.

The pressure control by-pass should be of sufficient size to allow the full flow of water to circulate when not being used in equipment for short shut-down periods, keeping water level constant in chilled water unit. This is very important if a water treatment is being used to control corrosion.

The storage capacity of most shell and tube chilled water units is very small and will overflow a large part of water when the circulating pump is shut down. The tubes in this type unit should be watched closely for corrosion and pitting. The syphon effect of the water entering the tubes results in a great quantity of entrapped air—this may, with some water, cause corrosion.

N.A.P.R.E. Question Box

NOTE: H. G. Venemann, Chairman of the Educational Committee, has agreed to answer through this column all questions asked by members of the N.A.P.R.E. Please send your questions to him care of Purdue University, West Lafayette, Ind.

Liquefying Carbon Dioxide

Question No. 805: Carbon dioxide gas is available from one source at 352 lbs. gage and from another source at 511 lbs. gage pressure. What is the best method of liquefying this gas and what would be the yield in pounds of liquid carbon dioxide per 1000 cu. ft. of gas from each source? How much refrigeration capacity would be required to liquefy 1000 cu. ft. of gas per hour from each source?—R.F.B.

ANSWER: When this problem was submitted to me it was stated that the pressure of the atmosphere was 12.6 p.s.i., and that the temperature of the gas was 60 F. Therefore, the gas from one source has an absolute pressure of 364.6 p.s.i., and the gas from the second source has an absolute pressure of 523.6 p.s.i.

From the Pressure-Enthalpy chart No. 2 of CO_2 in Refrigeration Theory and Applications we find that at 60 F. the first gas has a specific volume of 0.3 cu. ft. per lb., while the gas under 523.6 psia has a specific volume of 0.18 cu. ft. per lb. A 1,000 cubic feet of the first gas will weigh 3,333 pounds, and of the second gas 5,555 pounds.

Method No. 1. There are two simple methods for liquefying either of these gases. Method No. 1 would use a refrigerating system and condense the gas at its own pressure in an ammonia evaporator. By the use of this method the first gas will condense at a temperature of 11 F. and the second at a temperature of 34.5 F.

To condense 1,000 cu. ft. per hour of the first gas will take a 36.1 ton ammonia compressor which, if operating at —1 degree evaporating temperature and 85 degree condensing temperature will require about 57.8 brake horse power.

To condense 1,000 cu. ft. per hour of the second gas will take a 50 ton ammonia compressor, which if operating at 21.4 degree evaporating temperature and 85 degree condensing temperature, will require about 51 brake horse power.

Liquid CO_2 at 11 degrees when throttled to atmospheric pressure will produce 44.4 per cent dry ice; so for each 1,000 cu. ft. per hour it will produce 1,480 pounds of dry ice at the expenditure of 57.8 brake horsepower. This is a yield of 25.6 lbs. of dry ice per b.h.p. hour.

Liquid CO_2 at 34.5 degrees when throttled to atmospheric pressure will produce 38.4 per cent dry ice; so for each 1,000 cu. ft. per hour it will produce 2,130 pounds of dry ice at the expenditure of 51 brake horsepower. This is a yield of 41.8 pounds of dry ice per b.h.p. hour.

Method No. 2. Method No. 2 uses a CO_2 compressor which takes in the gas from the well at the pressure specified and delivers it to condenser where it is cooled and liquefied by water. Assuming that it is cooled to 85 degrees and at a pressure of 1,090 p.s.i.g., it will be a compressed liquid with an enthalpy value of 75 Btu per pound, and will produce 23.6 per cent dry ice.

The first gas will require about 42.5 brake horsepower per 1,000 cu. ft. per hour to compress, and will yield 18.5 lbs. of dry ice per b.h.p hour.

The second gas will require about 39.2 brake horsepower per 1,000 cu. ft. per hour to compress, and will yield 33.4 pounds of dry ice per b.h.p. hour.

A summary of the above results are tabulated below.

FOR EACH 1000 CU. FT. PER HOUR LIQUIFIED

Gas psia	Liquid Temp.	Method Used	Lbs. Liquid	Brake Hp.	Lbs. Liquid Per B.H.P.	Lbs. Dry Ice	Lbs. Dry Ice Per B.H.P.
364.6	11	No. 1	3333	57.8	57.7	1480	25.6
364.6	85	No. 2	3333	42.5	78.4	787	18.5
523.6	34.5	No. 1	5555	51	108.8	2130	41.8
523.6	85	No. 2	5555	39.2	141.6	1310	33.4

Conclusions. It is seen from the above results that Method No. 2 produces the greatest quantity of liquid per horsepower, whereas Method No. 1 produces the greatest quantity of dry ice per horsepower. So that the method used will necessarily depend upon the use to which the liquid will be put.

Computations. The computations for the capacity of the refrigeration machines used in Method No. 1 were based on cooling and condensing 1,000 cubic feet of each gas per hour from 60 F. to a saturated liquid. The brake horsepower required for the ammonia compressors were taken from Table III page 81 of the text. The brake horsepower required to drive the CO_2 compressors in Method No. 2, were taken from Table VIII page 86 of the text. This necessitated a conversion of the bhp./ton values to bhp./lb. of CO_2. With the first gas (364.6 psia) the refrigerating effect per pound was 67 Btu, giving 179 pounds per hour per ton of refrigeration. With the second gas (523.6 psia) the refrigerating effect per pound was 66.5 Btu, giving 181 pounds per hour per ton. The bhp/ton with the first gas was taken at 1.98 with 15 per cent added because the gas entering the cylinder was 60 F. instead of 11 F. with 10 degrees of superheat. The bhp./ton with the second gas was taken at 1.16 with 10 per cent added for reasons given above. In other words the bhp./ton given in Table VIII is based upon 85 F. liquid at 1090 psig and with the CO_2 gas entering the compressor with about 9 or 10 degrees of superheat; whereas this same compressor when pumping 60 F. gas will require additional bhp./ton.—H. G. Venemann.

Valve Stems Horizontal

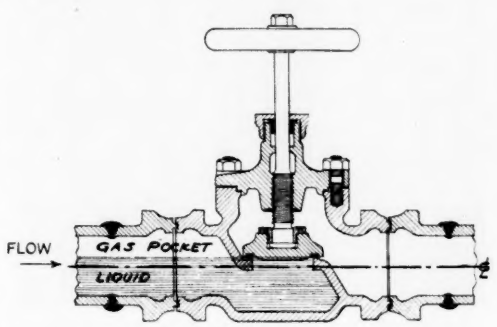
Question No. 806: It has always been my custom to place stop valves with the stem in vertical position on liquid lines to keep the liquid off the packing. Now I have been told that it is much better always to install all stop valves with the stems horizontal in liquid refrigerant lines. Is this latter method better? Why?—E.L.W.

ANSWER No. 1: I was tipped off by Emerson Brandt that this question had been discussed in the Chicago Chapter and that one of the members had cited an experience which was rather unusual. This experience is worth repeating: "A member of Chicago Chapter who does installation work recently installed an ammonia liquid pump system in a plant, installing a stop valve with the stem vertical just ahead of the pump. Result, system would not work properly. So another member of the Chicago Chapter was called in for advice. He told them to turn this valve so that the stem was horizontal, and with no other changes the system gave good results."

I have requested an answer to this question from the brother who recommended that the valve be turned horizontally, but for the life of me I can see no reason why it made the least particle of difference so long as the valve was wide open before and after the change. Let's hear from Gene Rytlewski on this for I must admit that he has stumped the professor.—H. G. Venemann.

Valve Design Provides Answer

ANSWER No. 2. It is very important to install all valve stems in a horizontal position as far as possible. All valves in a gravity flow liquid or liquid pump suction lines must be installed in a horizontal position to have a proper operating job. This has been proven in many installations on a pump system as well as gravity. If vertical valves will cause trouble on a pump job, they certainly will with gravity flow of liquid.



A study of valve design detailed in the sketch will show why this is true. The valve seat forms a dam extending above the vertical center of the valve and pipe. Note that more than half of the pipe will be filled with liquid and balance with trapped gas. The gas pocket prevents the liquid from filling the pipe so as to have full unrestricted flow. On a pump job this will cause the pump to gas bind, grind, wear more rapidly, and do less work.

Valves set vertically in a suction line to the compressor will cause liquid to build up in the line behind this dam. Frequently it will surge through and send liquid slugs to compressor. Also it may build up scale and heavy oil deposits.

A valve in horizontal position has a free opening the diameter of the valve disc and when installed in this position will eliminate many troubles. For instance, a vertical valve in the liquid drain line from condenser to receiver forms a gas trap which prevents non-condensable gases from passing down to the receiver where they are more conveniently purged.

As far as the worry about liquid on the valve stem packing is concerned, that has no justification in fact. No one worries about the valve stem packing on a high pressure hand expansion valve which is only cracked open and the solid liquid at high pressure is on the stem all around.

All good ammonia valves are built with a back seat just so they can be repacked under pressure and all packing is of the type to take ammonia and its maximum pressure.—Eugene Rytlewski.

N.A.P.R.E. Department

Compressor Capacity and Horsepower

Question No. 807: What is the difference in horsepower and capacity between an ammonia compressor operating at 20 lb. suction and 165 lb. discharge and operation at 50 lb. suction and 195 lb. discharge? In both cases the compressor raises the pressure 145 lbs. per sq. in., but the tables show the horsepower per ton is quite different.

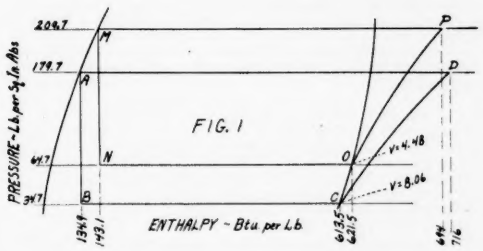
Will you please explain how much the horsepower per ton refrigeration is decreased when a machine is operated at the higher pressure levels. I know it is generally said that when the suction pressure is raised the hp. per ton drops but the capacity of a machine is increased. Does one cancel the other so that the same motor can drive a compressor at either pressure?—P.E.J.

ANSWER: To compute the difference in horsepower and capacity of an ammonia compressor while operating at the two sets of conditions specified, we refer T.E.S. to Table III, page 81, of Refrigeration Theory and Applications. If we take a two cylinder vertical single acting ammonia compressor, with 6 inch bore and 6 inch stroke operating at 300 rpm, its piston displacement is 58.9 c.f.m At 20 lbs. and 165 lbs. gauge pressures its capacity will be 58.9 divided by 4.55, or 12.94 tons; its brake horsepower will be 12.94 multiplied by 1.482 or 19.2. At 50 lbs. and 195 lbs. its capacity will be 58.9 divided by 2.39, or 24.6 tons; its brake horsepower will be 24.6 multiplied by 0.98, or 24.1.

Therefore the capacity difference will be 11.66 tons and the power difference will be 4.9 brake horsepower. In other words at the 50 lb. suction pressure the capacity increases about 90 per cent while the power increases only 25.5 per cent.

The influence of suction pressure on (a) capacity, (b) power, and (c) horsepower per ton may be viewed more clearly by studying Fig. 12 and Fig. 52 of the text. Fig. 12 shows the performance of an ammonia compressor which was tested in the Purdue Laboratory, while Fig. 52 shows the performance of a compressor operating on the theoretical cycle. Both sets of curves disclose three facts: (1) the capacity of a compressor varies directly as the suction pressure, (2) the horsepower increases with the suction pressure (but at a slower rate) until it reaches a maximum, after which it levels off and then decreases, (3) the horsepower per ton decreases as the suction pressure increases.

To understand clearly WHY these facts are true we should first study compressor performance via theoretical cycle as explained in Lesson 13 of the text. For example, let us analyze the performance of the 6x6 compressor while operating at the two sets of pressures, but on the theoretical cycle. A skeleton pressure-enthalpy diagram has been prepared, Fig. 1, but the pressures have been converted into lbs. per sq. in. absolute by adding normal barometric pressure 14.7 to the pressures given.



ABCD in Fig. 1 represents the cycle while operating at the low pressure conditions; MNOP at the higher set of pressures.

From Fig. 1, we obtain the following theoretical results: shown in Table I.

TABLE I

Operating Conditions	ABCD	MNOP
Gauge pressures, psi	20–165	50–195
Piston displacement, c.f.m.	58.9	58.9
Sp. volume, cu. ft. per lb. entering compressor	8.06	4.48
Lbs. per min. evaporated and compressed	7.31	13.15
Refrigerating effect, Btu. per lb.	478.6	478.4
Tons Capacity, theoretical	17.5	32.7
Power to compress, Btu. per lb.	102.5	72.5
Theoretical hp.	17.66	22.46
Percent increase in capacity, MNOP over ABCD	87 percent	
Percent increase in power, MNOP over ABCD	27 percent	

The refrigerating effects are C-B or 613.5 — 134.9 = 478.6 and O-N or 621.5 — 143.1 = 478.4 Btu. per pound of ammonia. The heat equivalent of compressor power is D-C or 716 — 613.5 = 102.5 and P-O or 694 — 621.5 = 72.5 Btu. per pound of ammonia.

These per cent increases in capacity and power are not much different than those given above for the same compressor under actual operating conditions.

The biggest single factor of WHY the capacity increases directly with the suction pressure is that the CAPACITY IS DIRECTLY PROPORTIONAL TO THE WEIGHT OF AMMONIA EVAPORATED AND PUMPED. The weight pumped is proportional to the specific weight (lbs. per cu. ft.) of the gas, and this increases directly with the suction pressure.

Two factors govern the power requirements of a compressor; (1) the weight of gas pumped, and (2) the power required per pound pumped. Using these two factors in cases ABCD and MNOP we obtain for ABCD, Power expressed in Btu per min. = 7.31 × 102.5 = 750; MNOP, Power expressed in Btu per min. = 13.15 × 72.5 = 953.

Here we have two factors which offset each other somewhat. At the higher suction pressure the weight pumped is 13.15 as compared with 7.31 whereas the power required is 72.5 as compared with 102.5.

The pressure ratio has a greater influence upon power requirements than pressure difference. Pressure ratio is always computed by using absolute pressures (not gauge pressures). In ABCD the pressure ratio is 179.7 divided by 34.7, or 5.18; in MNOP the pressure ratio is 209.7 divided by 64.7 or 3.24. Hence the lower power per lb. for MNOP, because its pressure ratio is less.—H.G.V.

New Questions

Predrying Freon System

Question No. 808: What is the best method for positive removal of moisture from coils and connections in a refrigerating system before charging Freon into it?—A.C.L.

Operation Above Critical Pressure

Question No. 809: I have read and studied your book, Refrigeration Theory and Application and am now an apprentice in the refrigeration field. A question has come up concerning carbon dioxide. According to charts it has a critical temperature of 87 F. and pressure of 1067 psia. Yet many mechanics tell me it is not uncommon to see carbon dioxide systems working in pressures of from 1200 to 1800 lbs. head pressure. If this is true, what happens and how is it possible to work above critical?—V.D.R.

Air Circulating Pattern

Question No. 810: With what direction of air discharge would you install two ceiling type fan cooling units in a refrigerated room 15 ft. by 24 ft. by 8 ft., 6 in. high, with a door centrally located at one end?—R.L.R.

Member Activities

St. Louis

By W. J. Wright

THE meeting of St. Louis Chapter was held in the cafeteria of the Falstaff Brewing Corp. Plant No. 1. A most interesting talk on the part refrigeration plays in the brewing of beer was presented by Nick Schleifer. It gave all of us a much better idea of the extreme care and the control methods exercised in the manufacturing of "the choicest product of the brewer's art."

Membership applications were received for Ralph Craycroft and Charles Good. Falstaff was host to a tasty lunch consisting of sandwiches and chili topped off by a generous supply of "Premium Quality Falstaff."

One of the best crowds of the season was in attendance for the meeting held in the Refrigeration Dept. of the N. O. Nelson Co., where over 80 members and guests enjoyed the affair. After a short business meeting, L. V. Fleiter gave a very interesting lecture on the use of booster units in low temperature refrigeration.

The lecture was accompanied with slides showing a variety of system arrangements and applications. Specific information was given to show the great savings possible with booster system in place of operating the whole system at low suction pressure in order to maintain low temperature in only a small part of the system. Mr. Fleiter is well known in local refrigeration circles and is one of our most active members.

The lecture was followed by a sound film on Jenkins valves which the Nelson Co. distributes in this area. Everyone certainly had a better understanding of valve applications besides being impressed with the care exercised in the manufacture of Jenkins valves.

Meeting was then adjourned to the banquet room where our hosts had prepared a most excellent buffet lunch. An abundant supply of refreshments was on hand, and we are all indebted to the Nelson Co., as well as our treasurer, Gene Bishop, who is one of their representatives, for a most enjoyable evening. Mr. Bishop conducted the party through the parts department and considerable comment was heard regarding the large stock of refrigeration parts and supplies carried by the company.

Colton

By H. O. Bonter

The regular meeting of the chapter was held in San Bernardino at the Santa Fe Ice plant. After a short business session, Southern California Gas Co. presented a motion picture, titled "Westward Flow," showing the laying of the natural gas pipe line from Texas to Los Angeles. It showed huge machinery required to clear the right of way and dig the ditch and lay the pipe. Also shown was the building of bridges crossing the rivers and the construction over mountains and across the hot desert sands, as well as the large booster pumping stations along the line.

A very interesting talk on the building of the new refrigerator cars in the Colton shops was presented by A. C. Lyon, general foreman of the Pacific Fruit and Express Co. car repair shops. After the program, the group enjoyed a round of hot dogs and coffee. A. S. Chantry reported that Victorville, little more than forty miles north of San Bernardino, had endured 42 in. of snow and the temperature had gone down to two degrees below zero.

San Francisco

By Hunter McLaughlin

This chapter's educational program, conducted by Prof. Stan Petersen, has reached the point in the course covering condensers and cooling towers. This subject was very well explained and, being a most pertinent part of refrigeration engineering, is proving very interesting to the membership. Prof. Petersen is to be congratulated for his excellent handling of this phase of our activities.

We are currently engaged in winding up arrangements for our Annual Hi Jinks. From the few hints dropped by Bert McKenna, the guiding hand of the affair, we have good reason to believe that it will be one of those never-to-be-forgotten evenings. A free ticket to the affair was given to each person who brought in two new members.

Our program for the meeting consisted of a talk and the showing of a motion picture explaining the uses and operation of the Liquid Freeze Corporation's Instant Freeze Machines being developed by the General Air Conditioning and Heating Co. of Oakland, Calif. Edward Simons, member of our Chapter, handled this phase of the program in his usual fine style.

With some misgivings and as a result of some persuasion from president Andy Hope, our brother Bob Kyle has embarked on the task of publishing our meeting notices. Bob's first releases are a great improvement over our past efforts and are most enjoyable to all of us.

Chicago

By E. B. Jones

The subject of suction super-heaters in Freon systems was discussed at the first meeting by Eugene Rytlewski, chapter instructor. He indicated that this equipment is necessary with flooded coolers in order to permit carry back of oil without return of liquid refrigerant to the compressor. The subject brought on a considerable amount of comment and questions from the audience which the speaker answered.

A number of interesting movies were supplied by Don Parkhurst, Burge Ice Machine Co. One showed the manufacture of Typhoon air conditioning units while another depicted and explained the Cargocaire system of protecting boat shipments from moisture damage. An excellent series of movies on the elements of good salesmanship completed the program.

At the second meeting, Mr. Rytlewski continued his lecture course on the subject of different types of thermal valve bulb charges and how to install thermal valves properly. He mentioned that a certain charge called Type X is used on low temperature work. The question on the operation of a compressor at two different suction and discharge pressures was discussed by Douglas Benton. By means of Mollier diagram and calculations, he showed how the motor horsepower requirements and horsepower per ton would be varied by a change in pressure.

The chapter authorized expenditure of a maximum of $225 for the purchase of a sound movie projector, and Leslie Clifford was authorized to negotiate for the purchase.

Special speaker of the evening was Si Rothmayer of Samuel Lewis and Associates, air conditioning engineers. Mr. Rothmayer first defined the term "air conditioning" and he explained the function of the individual pieces of equipment as it contributes to a complete air conditioning system. Then Mr. Rothmayer proceeded to a discussion of troubles encountered in the operation of systems and how they are corrected to produce satisfactory results. Among the specific problems discussed were the elimination of objectionable odors which develop in connection with air conditioning systems, methods of cleaning air filters, coils and duct work, and problems of control.

Yakima

By Elmer Toop

The officers elected to serve the chapter during the year are:

President, Luther Stewart.
Vice-president, Lenos Nell.
Treasurer, Elmer A. Toop.
Secretary, Seth Drake.
Corresponding Secretary, Edmond Allard.
Director, W. E. Mavity.
Educational board: Elmer A. Toop, Lenos Nell and George Tilbury.

In addition to the usual year-end business and reports, the chapter enjoyed the showing of a sound motion picture, "Appleland."

Dallas

By D. F. Bancook, sr.

The 1949 officers elected by the chapter are:

President, L. W. Ridener.
Vice-president, W. D. Cunningham.
Secretary, Tom Roberts.
Educational Committee: Elliott Hallowell, chairman; Jim Moss, L. P. Reese.

Mr. Hallowell has outlined a very interesting and educational program for the year, with a course in air conditioning included, which we need very much.

Our past president, J. Ed. Lawrence, through whose efforts this chapter was made possible, will always be on our advisory board, and he was given a rising vote of thanks for his work and leadership in 1948.

N.A.P.R.E. Department

Fresno

By K. W. Findley

Elected at the first meeting of Fresno were the following officers for 1949:

President, H. Bauder.
Vice-president, J. P. Culwell.
Secy.-Treas., K. W. Findley.
Sergeant-at-arms, C. Campbell.

After the installation the members went to a local restaurant for a delicious dinner. Our meetings are showing an excellent percentage of attendance and we are encouraged by the interest in the work of the chapter.

Memphis

By Chas. Conley

The chapter members and other friends were honored with a plant inspection tour through the Tennessee Brewery, home of "Gold Crest No. 51" beer, one of the oldest breweries in the United States. Although the plant still has a considerable amount of the original equipment, an expansion program has been carried on during the past two years. Included was a new bottling plant which is the last word in design of the building and its equipment. Refrigeration in the bottling plant is provided by York Freon machines and in the brewery proper they have infrigeratin in the bottling plant is provided by York Freon machines and in the brewery proper they have installed a new York ammonia refrigerating machine with the latest design of refrigerating system complete with suction traps and liquid pumps to return excess liquid to the high side. More than a million dollars has been spent in this plant during the past two years. The chapter group were the guests of J. B. Schoor, Sr., president; V. J. Schoor, assistant to the president; J. B. Schoor, Jr., superintendent and brewmaster, and his assistant, Paul Barth. Our chapter was the first group to go through the plant after the improvements were made. Chief engineer Wm. Ryan and his assistants had come back to the plant to show us through and explain the making of beer and the operation of the equipment.

This was a most interesting trip. Then we were served an excellent supper provided through the courtesy of the brewery by Cooper's catering service which is well known for the fine food it serves.

New Orleans

By Frank Gillio

A fine group of chapter members attended the first meeting of last month which was a plant visit to the Hibernia Bank Building. The affair was arranged by our member, Frank Chase, chief engineer, and the building management. This building has two Carrier Centrifugal compressors, the condensers of which were being retubed, and also new tube sheets installed. This retubing was caused by moisture getting into the system. However, with the installation of an evacuator, the possibility of moisture again causing damage will be very remote. The members were conducted through the entire boiler and engine room by able assistants and the operation of all equipment was fully explained. Liquid and solid refreshments were served by the Building Management. After partaking of the refreshments the members were treated to a visit through the WDSU Television Transmitter Station on the roof of the Hibernia Bank Bldg., which was just recently placed in operation.

J. R. Vernon of the Johnson Service Co. was the guest speaker of the evening at our second meeting. The speaker with the aid of slides delivered an outstanding and educational talk on the servicing and operation of various types of automatic temperature controls for heating and air conditioning. The attendants appreciated this talk and at the conclusion Mr. Vernon was given a rising vote of thanks.

On Wednesday, March 9, a film on the operations of Public Service, Inc., was shown. This film showing the electrical and gas service and also the transportation service of electric trolleys, gasoline busses and street cars and what the Public Service is doing to render trouble-free service to all New Orleanians, was well received.

After the showing of the film, Harry Duke of the Bussman Mfg. Co. of St. Louis was introduced by Educational Director Vivien, who gave a slide lecture and actual demonstration on Fusetrons. In comparison with the ordinary type fuses it was shown that a Fusetron with a thermal element will protect a motor in case of single phasing while an ordinary fuse offers no protection unless the fuse heats considerably and blows. Before this happens the motor may heat and burn out. The members were impressed by this demonstration and the valuable information given out by Mr. Duke.

Andre J. Damiens, apprentice engineer was accepted as a member and was given the oath of membership by treasurer Geo. Whitman. Thomas O'Connor, local membership chairman, has promised us results in the securing of new members and is wholeheartedly behind National Chairman William Finnegan in helping to make 1949 the outstanding year in the membership drive.

Los Angeles

By Fred Herr

The meeting attendance record compiled by Los Angeles Chapter during the first two months of 1949 was still further fortified at the March 2 meeting in the Los Angeles Terminal Club when Bill Burnett's membership committee and Regis Gubser's educational committee collaborated in accomplishing a turn-out of even larger proportions. The announcements sent out by Secretary George Paulick disclosing that Gubser himself would present the night's educational feature seemed to serve as a lure which drew a standing-room-only throng to the meeting hall.

Dale Rycraft, chairman of the entertainment committee, sought membership reaction to a contemplated change in the method of presenting the annual Jamboree, the 1949 edition of which is scheduled for some time in October or November. The committee, Rycraft reported, was undecided whether to pursue the policy of past years in offering a massive entertainment program in the Los Angeles Breakfast Club, with tickets available to the general public; or to confine the affair to a smaller scale, with attendance limited to members. The committee was delegated by President Rudi Kettler to obtain further information on both proposals for presentation at the April 6 meeting.

Some members expressed the opinion that the entertainment previously presented as a large-scale separate Jamboree, might with entire practicability and favorable financial results, be combined with the chapter's annual Ham-and-Beans Dinner at PFE Hall in September.

Chairman Burnett of the membership committee reported that a total of 43 new members had been obtained thus far this year, bringing the chapter's enrollment to 312, numerically the largest in the NAPRE.

The total of 312, he explained, was exclusive of the new members enrolled at the March 2 meeting. The three chapter teams competing in the 1949 national membership campaign, Burnett reported, stood as follows, as of March 2: Independents team, 24 new members; Union Ice Co. team, 13; California Consumers Corp. team, 6.

"There's room on that wall for a third pennant," Burnett declared, pointing to the wall of the meeting hall on which hung the 1947 and 1948 gonfalons awarded to Los Angeles Chapter. A. R. Moberg was iuducted as a new member at the March 2 meeting. T. A. Fisher, Ernest Hammersmith and L. Howard were approved for reinstatement.

Regis Gubser, chief engineer of the California Consumers Corp., assisted by a staff of technicians from that company, directed the program for the educational session. His subject, which he treated in an extemporaneous style, dealt with "Magnetic and Direct Current Phenomena." It consisted of a series of interesting experiments with laboratory electrical equipment, most of which a refrigerating engineer is concerned with some time or another.

At the previous meeting, Donald Byl was awarded two prizes for pre-eminence in inducing prospects to sign on the dotted line for membership. One prize was a standard award given to the man who brings in five new members. The other was a special prize offered by President Rudi Kettler in the form of several cans of custom packed tuna, which was awarded to Mr. Byl for being the first man to sign up ten new members in the current campaign.

The speaker at this session was Ed L. Nelson, chief engineer of the Union Ice Company. He gave a talk on the week-long condensed course in refrigerating engineering which he had recently attended at Texas A & M College.

Ed's informally narrative style of speaking was ideally suited to this type of talk and he presented an interesting informative description of the subjects, and their manner of presentation, at the Texas school. He high-lighted his comments with Kodachrome slides.

Stockton-Modesto

By R. M. Edger

We have had two meetings this month, featured by discussions of operating topics by industry representatives. At our meeting in Modesto, Mr. Schuldt of Standard Oil Co., California, gave us a talk on some of the newer greases which have recently been put on the market and their various uses in industry. This proved to be very interesting since new lubricants have not been in use for very long, and many of us gained helpful information about them. The Modesto gang served refreshments which everyone enjoyed.

At the following meeting, J. A. Price, Gates Rubber Co., gave us a talk on V belt drives. He started his lecture from the beginning of the manufacture of synthetic rubber up to the present time and told us about new cords that go into V belts and how they are manufactured. Mr. Price fully explained each point in his lecture and made himself understood thoroughly. A good speaker, he presents an interesting subject well, and we would highly recommend this lecture for other chapters.

Pittsburgh

By Lewis P. Mantz

The chapter welcomed James Morris to membership. He is one of the firm of Jenkins, Morris and Johnson, local refrigeration engineers and machinists. Earl Bogard of the John Wenzel Packing Co., Wheeling, also joined recently. The meeting featured discussions on plant operation and equipment.

We were sorry to learn of the death of John B. Walker, Jr., who joined the chapter last year. Mr. Walker served as a pilot in the Army Air Force during the last war and attained the rank of Captain. He was an engineering graduate of the University of Pittsburgh and on his return from service became associated with the American Metallic Packing Co. Mr. Walker failed to recover from an operation for appendicitis. The chapter expressed its sympathy to the family and sent a basket of flowers to the funeral.

Los Angeles and Marion Lead in Membership Race

THE announcement of the 1949 Membership Contest found several chapters actively engaged in building their strength. In view of the convention scheduled for Purdue in the fall, it was announced that the chapters would advance by their work through the usual scholastic grades. Perhaps it was not realized how hard some of the contestants would work during the early months. At any rate the first check-up shows that 2 chapters skipped through the lower grades with remarkable speed and now find themselves perched at the top of the list under the lofty title of Seniors. Perhaps a graduate school will have to be set up for these particularly studious people and hard workers.

Los Angeles has not allowed the momentum of its previous efforts to lapse. By keeping at it they have already secured 42 new members this year which gives them their high place at the present time. Marion Chapter set up a new program and went out to secure new members to take advantage of it. As a result they have rolled up a total of 75 percent points to rank them at the top in that division.

Detroit with consistent work on both renewals and new members has attained the sole spot in the Sophomore class. Fourteen more chapters have started their program of membership building and are ranked among the Freshmen. A number of other chapters remain to join in the race at a later date.

Chairman William Finnegan visited national headquarters during the past month. He has a number of plans for assisting the chapters to obtain better results this year in their membership work. He also expects to work on the establishment of several new chapters. With First Vice President Emmett Quinn he is keeping in close touch with the chapter membership committees and also has plans to assist the chapters nationally to secure additional members in their local areas. The contest really is just in its beginning and a number of chapters report that they are setting their plans in motion to make the competition stronger for the present leaders.

The ranking of the chapters in the contest is as follows:

Seniors	
Marion	Los Angeles
Sophomores	
Detroit	
Freshmen	
New Orleans	Minnesota
Pittsburgh	Fresno
Chicago	San Jose
San Francisco	Yakima
Sacramento	Memphis
Dallas	Portland
Seattle	Stockton-Modesto

1949 Convention at Purdue Nov. 8-11

THE invitation extended by Professor Venemann to meet at Purdue University in 1949 was received with great enthusiasm by the New Orleans Convention attendants. Later the board of directors studied the matter and appointed A. R. Carlson and Emerson Brandt to work out the arrangements. Early in this year they went to Purdue to inspect facilities and meet with Professor Venemann, Merle McClure, Coordinator of Adult Education and others of the staff.

They found that the Union Building on the campus has an excellent meeting hall and space for exhibits. A majority of the attendants can be accommodated in the sleeping rooms in the Union Building while hotels nearby will provide for the remainder. The excellent local accommodations along with the central location of the University at Lafayette, Ind., provide an ideal setting for the 1949 meeting.

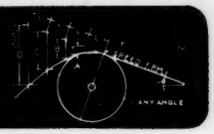
With the cooperation of Professor Venemann and the engineering staff at Purdue the program of this 40th annual convention will certainly be outstanding. Long known as one of the leading engineering institutions Purdue University has specialists in many lines along with outstanding laboratory and demonstration facilities. The program of the convention will feature lecture-demonstrations of subjects specially designed to give the attendants information and material they can use in their plant operations. The program is now in preparation and the details of it will be announced later.

The meeting at Purdue has evoked wide interest among the membership and many are already making plans to attend. Numerous inquiries about the exact convention dates have been received at national headquarters. The dates of November 8-11 have already been ringed on members' calendars and many others will wish to make their plans for the fall with these convention dates in mind.

Refrigeration in Venezuela

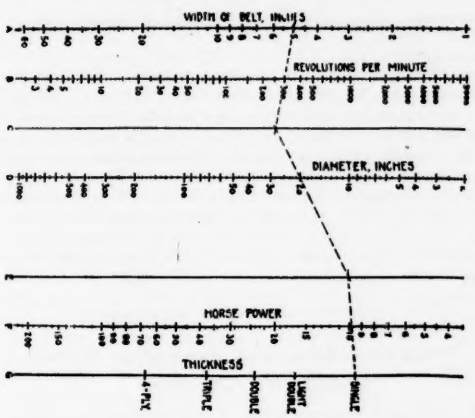
Andres J. Hartmann of Caracas, Venezuela called at National Headquarters recently. Mr. Hartmann, who is a refrigerating engineer with the Agricultural and Animal Husbandry Dept. of the Venezuelan government, is in the United States to purchase refrigeration equipment for a number of cold storage and ice plants to be erected in that country. He joined the Association and secured a set of the Operating Data Books which, he said, had been recommended to him as providing useful information on present refrigeration practice in this country.

ENGINE ROOM POINTERS –



Handy Belt Transmission Chart

THIS chart quickly tells nearly everything that one might want to know about a flat leather belt drive. Simply zigzag across the chart as indicated by the dotted lines and you can get whatever estimate is required. The chart includes all widths of belts varying from 1 to 60 inches; all revolutions per minute varying from 3 to 9000; and all pulley diameters from 2 to 1000 inches.



To use the chart, find the width of belt in inches in column A and then run a straight line through that width and the pulley revolutions per minute in column B and locate the intersection in column C. Then from that point of intersection run through the diameter of the pulley in inches in column D and locate the intersection in column E. Then finally, from that point of intersection run over to the thickness of the belt in power. If, after reaching column E, the horse power is known and it is not certain whether the belt should be a single, light-double, double, triple, or four-ply, run a straight line through the intersection in column E and the horse power in column F and the intersection with column G will give the number of plies or thickness of the belt.

Regarding column G, these spaces are based on figures that were determined by the late celebrated Frederick W. Taylor who originated efficiency engineering. Thus, a light-double belt will transmit about 33-1/3 per cent more power than a single belt. A double belt will transmit about 50 per cent more than a single belt; a triple belt will transmit about twice as much; and a four-ply belt will transmit about 2 ½ times as much as a single belt.

If the thickness of the belt, horse power, diameter of pulley and revolutions are known, and it is desired to determine the width of the belt, begin at the right of the chart and zigzag over toward the left, and the width is found in column A. Thus, if four of the factors are known, the fifth is easily determined by simply running straight lines across the chart as already explained.

For example, the dotted zigzag lines across this chart show that if the width of the belt is 5 inches, the pulley makes 300 r.p.m., and is 20 inches in diameter; and the belt is a single-ply belt, it will transmit 9.8 hp.

Pointers on Selection of Valves

IT IS NOT always as easy to select the right valve for a given purpose as might be supposed. Why? Because there are so many different types of valves: gate, globe, cross, plug, butterfly, reducing, stop, angle, needle, diaphragm, and so on almost endlessly. Therefore the valve, first of all, must be of the right type. Then the valve must be suitable for the liquid or gas to be handled.

Modern valves are made of many metals and other materials including forged steel, cast steel, malleable iron, cast iron, ferro-steel, brass, brass alloys, fibre, lead, monel metal, nickle, stainless steel, and, today, even of plastic materials. Whatever the material that may be deemed best for the purpose there is always a possibility that it can be used for the making of a valve to resist the gas or liquid to be handled. There are a number of concerns that make "special" valves to specifications—valves that are not standard.

Where water is to be handled its acidity should always be given consideration. In large and long pipe lines carrying steam strong and tough valves are essential because of the expansion and contraction strains that result, possibility of water hammer, stresses caused by the weight of the pipe itself, probably misalignment during the process of erection, and the possibility of settling after erection.

Also, if steam is to be handled investigate the possibility of cutting effect by the steam on the valve disc and seat as the steam passes through. This cutting effect is particularly noticeable in certain types of reducing valves in which the disc is held close to the seat. The reducing valve that operates wide open most of the time is invariably more durable than those that are nearly closed most of the time.

In general the best practice limits the size of screwed valves to 6 inches. Those valves that are larger are flanged, or, they are arranged for welding into the pipe system. Welding, during recent years, has played an important part in connection with valve usage and valve selection.

To find the limiting water pressure of a valve, multiply the limiting steam pressure by 1.4 for 12-inch sizes or smaller than 12 inches. For 14-inch sizes or larger than 14 inches multiply by 1.2.

This Statement Is Not True

THE writer has before him a publication pertaining to power transmission in which the following dangerous statement is made regarding static electricity in belts: "The most common cause of static electricity in belts is slippage. Internal friction also causes static. Proper lubrication of the internal fibres reduces friction and at the same time stops slippage. Both causes of static are therefore removed."

The dangerous part of the statement is that nothing is said about belt creep. Creep, which is a form of slip, and is unpreventable, also causes static. The best static remedy is to make belts conductors of electricity. As long as a belt conducts electricity, there will be no static. Thus belts made of steel never give any static trouble. Belts that are treated with glycerine or other fluid that causes them to conduct the current will not give any static trouble even though they slip or creep.

Refrigerated Warehousing Industry

NEWS • ARTICLES • ANNOUNCEMENTS

NATIONAL ASSOCIATION of REFRIGERATED WAREHOUSES

Division of American Warehousemen's Association

Executive Offices:
Tower Building, Washington 5, D. C.

Secretary, W. M. O'Keefe
Executive Vice-pres., Wm. Dalton

President, Arthur N. Otis
New York, N. Y.

Vice-president, Fred F. Alford
Dallas, Tex.

Treasurer, J. L. Gagini
Omaha, Nebr.

Legislative Chairman Reports on Pending Legislation

A BULLETIN has been issued by J. P. Johnson, chairman of the Legislative Committee of the National Association of Refrigerated Warehouses calling attention to Senate Bill 900 and House Bills 2682 and 2280 amending the Commodity Credit Corporation Charter Act and other pending legislative proposals. The bulletin recommends that the association go on record with the Senate Committee on Agriculture and Forestry, before whom hearings have been concluded, setting forth the following.

1—That with the functions of CCC made subject to "supervision and direction of the Secretary of Agriculture," as proposed in the Bill, the program of the Department of Agriculture for new refrigerated warehouse construction as already voiced in reports submitted under the Hope-Flanagan Act, guised by Market Research, would undoubtedly be given added impetus, thus seriously endangering Public Refrigerated Warehouses and placing the Government in the role of a competitor. It is true that the Bill does not specifiy Public Refrigerated Warehouses, but on the other hand they are not exempt from its provisions.

2—The amount of refrigerated storage space available in the country today, as taken from Department of Agriculture reports, with the latest figures on space occupancy; and the further statement that it is ample for all needs..

This same data should be given to the House Committee on Banking and Currency, which now has before it similar bills—H.R. 2682 and H.R. 2280. It is suggested that contact be made with other National Associations which may have an interest in the matter.

In this connection, there are other bills which have a tendency toward government constructions or assistance in the construction of refrigerated warehouses; namely:

H.R. 1376—To provide aid to farmers in securing farm housing and other farm buildings; now before the House Committee on Agriculture. This could cover the construction of small cold storages for private use, principally apple storages, which has often been the subject of discussion in Chapter Meetings.

H.R. 1553—To amend the Internal Revenue Code to provide an amortization deduction for creation of additional farm storage facilities, now before the Committee on Ways and Means of the House. Same danger as above.

S. 663—To provide for an adequate national reserve of agricultural commodities and other purposes; now before the Senate Committee on Agriculture & Forestry. This is the bill requested by Secretary Brannan and while it covers storage for corn, wheat and cotton, principally, can include refrigerated warehouses.

S. 138 and S. 685—To provide assistance to farmers in securing farm housing and other farm buildings, and for other purposes; now before the Senate Committee on Banking and Currency. Same danger as H.R. 1376 and 1553.

In addition, the bulletin states, the Association must decide the course of action it should take on the activities of the Department of Agriculture under the Hope-Flanagan Act, because these bills, particularly the ones under consideration (Commodity Credit Corporation Charter Amendments) stem from their activities or at least further their intentions.

Warehousemen Seek Exemption From Additional Overtime

A BULLETIN issued by the American Warehousemen's Association points out that Bills H.R. 858 and S. 336, now pending before the Committee on Labor and Public Welfare of the United States Senate (Hon. Elbert D. Thomas, Chairman), would amend the federal Wage-Hour Law in such a way as to relieve certain employers from the obligation to pay additional overtime wages to employees, occasioned by decisions of the United States Supreme Court in the so-called "Bay Ridge" and "Huron" cases (335 U.S. 338).

These bills, however, are limited in application to the longshore, stevedoring, building and construction industries, and a statement is now being prepared to be presented to the Senate Labor Committee urging (1) that the public warehousing industry be covered in the bills; and (2) that the legislation be made retroactive so as to prevent the institution of suits for back overtime pay.

Many warehousemen in this country are vitally interested in this issue and may find themselves confronted with serious problems if remedial legislation is not enacted, the bulletin states. All AWA members are requested to write their Senators and Congressmen in Washington urging amendment of H.R. 858 and S. 336 to cover the public warehousing industry and requesting the provisions of the bills be made retroactive.

Representatives of the refrigerated warehousing industry appeared before the Senate Labor Committee and presented a statement embodying facts in opposition to the proposed legislation. It pointed out that the warehousing industry, both general merchandise and refrigerated, because of the very nature of their business and the close affiliation with the longshore and stevedoring industry, should be included in the provisions of the Bill at this time. It stated that to omit a retroactive clause in such a bill is entirely unfair to

the industries covered, and can only result in a chaotic situation, and the industries should be protected by a provision to eliminate the possibility of such suits.

It was therefore respectfully urged that the committee recommend: (1) The inclusion in the legislation under consideration of all general merchandise and refrigerated warehouses comprising the warehouse industry and (2) the inclusion in the legislation under consideration of a retroactive clause protecting the industries named therein from any and all liability under the decision.

Educational and Market Development Sections Combined

THE Educational Section and the Market Development Section of the Fish and Wildlife Service, U. S. Dept. of Agriculture, has been combined into one section effective February 14. This new section will carry on the duties and functions of both sections and will be called tentatively the Educational and Market Development Section.

The sections are being combined in order to conduct their work more effectively, eliminate any possibility of duplication, make better use of the funds available in view of increased operating costs, and eliminate some confusion in the minds of the industry and others as to the difference between activities of the two sections. Savings will be effected through reduction in the number of personnel required to carry out the program. At an advisory meeting in the fall of 1948, it was suggested by a group of industry representatives that combining the two sections be considered.

The new section will be headed by Donald Y. Aska, formerly Chief of the Educational Section. His immediate assistant will be Arthur Sandberg, formerly Assistant Chief of the Market Development Section. Ralph Russell, former Chief of the latter Section, is being assigned a specific field of activity in the new section involving the preparation of Quarterly Marketing Outlook reports and similar reports issued on a monthly basis. Activities of the field personnel will remain much the same as before the consolidation.

Warehouse Group Organized for Mobilization Planning

ORGANIZATION of a general committee and five task groups to provide advice and information on the Nation's domestic transport and warehousing system for use in mobilization planning was reported to Presidential Assistant John R. Steelman, acting chairman of the National Security Resources Board.

General chairman of the committee on domestic transport and storage is Col. J. Monroe Johnson, Director of the Office of Defense Transportation. The task groups working with him are making studies in the fields of railroad transport, street and highway transport, inland water transport, pipe lines, and warehousing and storage.

Industry, civilian agencies of the Government and the military services are represented on each of the task groups. Their findings will be correlated by the NSRB staff into a comprehensive program for the mobilization of all transport and storage and submitted to the Board as a basis for recommendations to the President.

Chairman and secretary of the warehousing and storage group are: Chairman, Col. Leo M. Nicolson, president of Nicolson, Porter and List, Chicago, Ill.; secretary, Harold E. Osgood, vice-president, Fairfax Storage Co., Kansas City, Mo.

NARW Officials Receive Decorative Garlands from India

AN UNUSUAL feature of the recent Annual Meeting of the National Association of Refrigerated Warehouses in San Francisco was the presentation to incoming and retiring officers of decorative garlands from India where they are known as Haars. The haars were presented to NARW's new President, Arthur N. Otis of New York City; retiring NARW President, Edgar M. Burns of Portland, Oregon; and retiring AWA President, Harlan J. Nissen of Los Angeles, by Shib Chander Kumar, Director of the Saharanpur Cold Storage, Ltd., Saharanpur, India.

Mr. Kumar (second from left) exchanges greetings with Messrs. Burns, Nissen and Otis after presentation of haars.

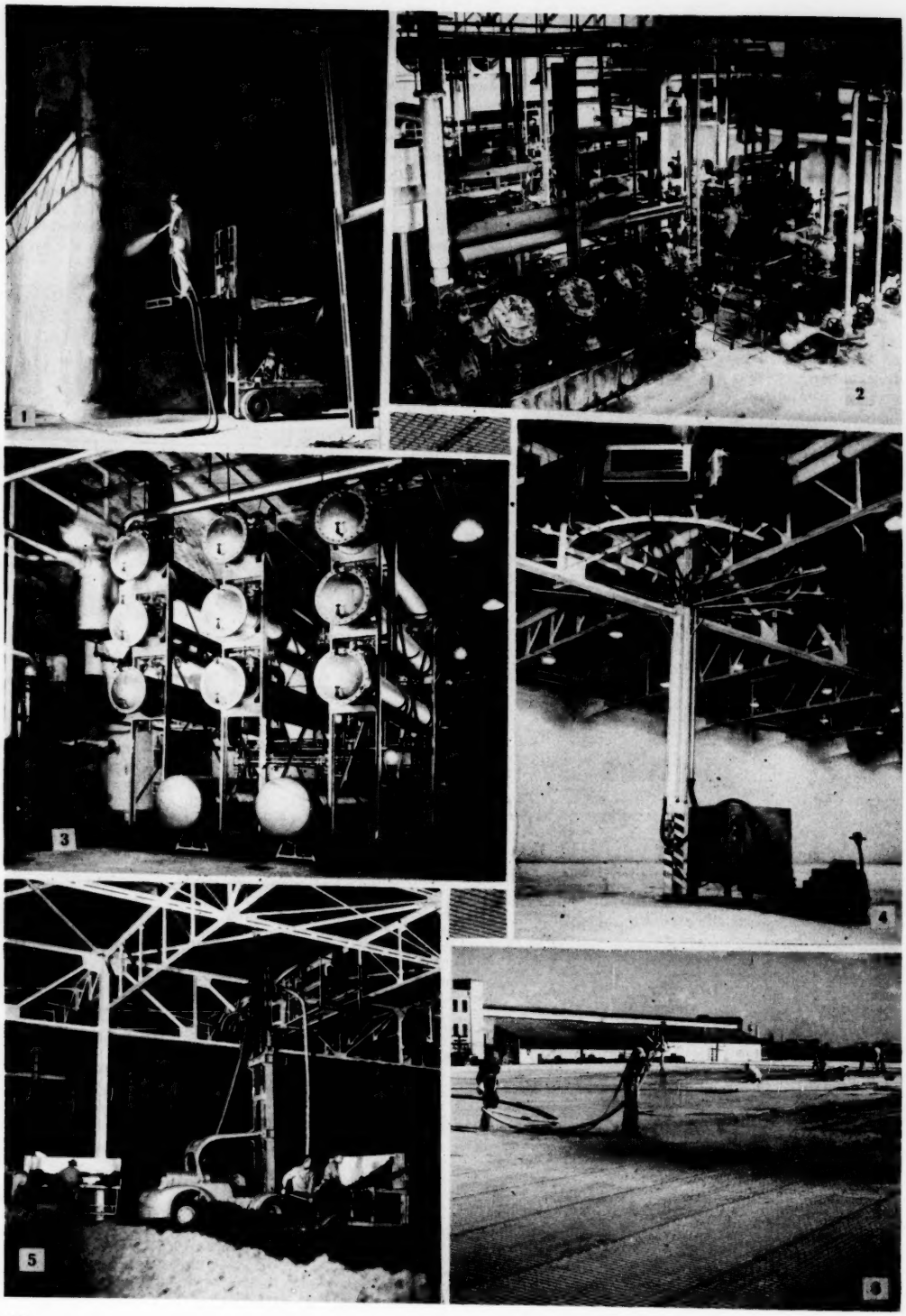
In making the presentation, Mr. Kumar explained that it is the custom in his country to present haars to civil, religious and industrial leaders in recognition of unusual accomplishment and achievement. The presentation accented the international aspects of the refrigerated warehousing industry which is constantly expanding, not only in the United States, but throughout the world. Mr. Kumar came to America to attend the NARW convention and study the latest scientific methods of food storage and refrigerated warehouse operating techniques.

Suit Charges Loss of Stored Apples

A $20,000 damage suit has been filed by David Watson, doing business as Watson Orchards, and R. A. Watson, both of Jerseyville, against the City Ice & Fuel Co. The Watsons charge that they delivered 21,000 bu. of apples in good condition to the defendant at the National Stockyards in St. Clair county in 1947 for storage and that $20,000 damage to their property resulted because of improper storage, care and handling. Edwin G. Bermann, of East S. Louis, agent for the firm who allegedly made an agreement with the Watsons for the proper storage of apples, was also named as a defendant in the suit.

Scientific Advisory Council TRRF

A MEETING of the Scientific Advisory Council of the Refrigeration Research Foundation was held at the Palmer House, Chicago, March 9-10. The purpose of the meeting was to review the research projects now underway and planned, and to make recommendations for future projects and other work.



Details of New Alford Refrigerated Warehouse Showing New Methods Utilized

THE construction of the new Alford Warehouse in Dallas was described in the previous issue (I & R, March 1949, page 53.) These photos on these two pages illustrate various phases of the plant erection and equipment and further explain the interesting methods employed.

Photos on Previous Page

(1) The walls were sprayed in place from a movable platform on a fork truck. These walls are actually insulated partitions and carry no weight. Rigidity is provided by fabricated steel studs placed vertically with horizontal wood strips fastened to them. The paper-backed steel mesh was then nailed on to hold and reinforce the 1½ in. concrete wall sprayed in place by the Gunite process. Inside walls were similarly constructed and the 12 in. space between packed with redwood bark insulation. The outside wall was coated heavily with a rubber base paint to moisture-proof it.

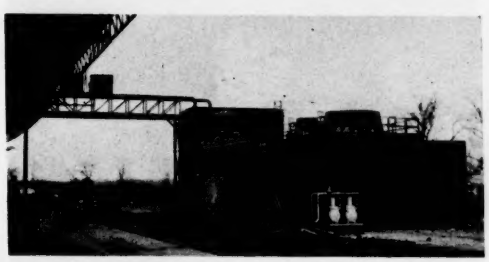
(2) A general view of the engine room shows an eight cylinder V-type gas engine generator unit on the left. On the right is one of the Ingersoll-Rand combined gas engines and ammonia compressors. On one base is the V type gas engine with the ammonia compressor cylinders in the horizontal plane.

(3) Nine Frick ammonia condensers, each with over 1000 sq. ft. of 1¼ in. tube surface, are arranged for 4 passes of the water. The condenser shells are 24 in. by 18 ft. and the two liquid receivers below are 36 in. by 18 ft. All make-up water for cooling purposes is softened and treated to inhibit corrosion. An oil separator, upper left, is installed in the gas line and a refrigerated liquid line oil separator is also employed to insure positive results.

(4) Above is one of the larger groups of unit coolers in a freezer room. Twelve Recold water defrost units are arranged in a circle and connected for flooded operation with accumulators and float switch on each group. They provide a good pattern of air circulation without ducts and with a minimum of ceiling load. Defrosting water supply and drain pipes are on the column. The defrost truck, consisting of a baffled water tank and pump is connected to the defrosting lines and the units are defrosted in groups of three.

(5) Roof insulation was applied from below. The ceiling is formed by corrugated aluminum sheets placed on the lower angles of the roof joints. Then the space thus formed was filled with redwood bark insulation blown into place. A platform on a fork truck replaced the usual scaffolds.

(6) The roof deck, like the walls was a light concrete slab reinforced with paper backed steel mesh and placed with the Gunite process. The waterproof finish was roofing felts and two courses of aluminum sheets laid in hot asphalt. The top aluminum sheet was not flooded with asphalt so that the bright surface would give maximum heat reflection.



Left—This view in one of the cooler rooms gives a good impression of the extent and the height of the piling spaces for goods. Barrels are placed 5 tiers high while cartons of packaged goods are placed 4 pallets high. With column spacing of 50 and 55 ft. the obstructions to pile arrangement are held at a minimum, and wide aisles are provided for rapid handling by counterbalanced fork trucks.

Above—The induced draft cooling tower in the foreground has a rating of 4500 gpm and serves the condensers while the higher tower in rear provides 1000 gpm. of engine cooling water. The water pipes with welded on struts form their own bridge over the tracks with the 14 in. condenser water pipes below and the 8 in. engine water-pipes above.

Activated Carbon for Pear Storage

FOLLOWING tests conducted by Dr. Hartman and Prof. Hansen of Oregon State College which revealed that D'Anjou pears could be kept until late May in activated carbon air-purified storages and were still hard to firm at this late period, Duckwall Bros., Inc., Hood River, have installed air purification units throughout their large storage plant. It is believed that this is the first time these "gas masks" have been used in pear storages. Already firmly established in apple storages, indications are that storage air purification will do much towards preserving the life and quality of pears while under refrigeration.

The Duckwall plant has a capacity of over 200 carloads of apples and pears, requiring the installation of eight units, each with a capacity of 20,000 bushels.

Research findings on pear storage behavior indicate that there is a basic similarity between apples and pears. Both fruits give off ripening gases in amounts that vary at different stages in their life cycle. Hence it is presumed that, as in the case of apples, if one lot of pears is at a point where they are producing a considerable quantity of gas this lot can stimulate the ripening of all of the other less mature fruit in the storage. By cleansing the atmosphere of these naturally-evolved gases the cross-ripening effect is considerably retarded.

Krug Accepts New Civic Post

F. Stanley Krug, Jr., president of the Cincinnati Ice Manufacturing & Cold Storage Co., recently was elected president of the Cincinnati Convention and Visitors' Bureau. He is shown above (left) with J. W. Cassin (center) retiring president and Wm. McGrath (right) recently elected president of the Cincinnati Chamber of Commerce.

Refrigeration of Milk and Cream

STUDIES of the off-flavors which develop in milk and cream held under frozen or refrigerated conditions, and of the physical changes in milk frozen from long storage, are being made by the Bureau of Dairy Industry of the United States Department of Agriculture. If it can be learned how to handle or treat these dairy products when they are held under low temperatures, more efficient utilization might result through more successful carryover of such products from surplus to deficit periods or areas. It is known that the resistance of milk to oxidized or cappy flavors may be increased if the milk is fortified by the addition of vitamin C. The possibility that the flavor of frozen milks may be stabilized by similar treatment is being studied.

Citrus Fruit Storage Tests

SOME interesting facts have been uncovered from tests on citrus storage being conducted as a Refrigeration Research Foundation project, although no complete conclusions are available from the first year's work. Plans for continuing the project were made January 14 at Beltsville, Md., according to a recent TRRF bulletin when D. F. Fisher's group and other Department of Agriculture workers met with Director Diehl.

For oranges only two temperatures, 32 and 38 F., will be used. Curing tests probably at 50 to 70 F. before and after packaging will be included. Indian River oranges from the Florida east coast will not be included. Pickings will be limited to two. Standard techniques and possibility of commercial scale testing were considered and this will be worked out later. Storage periods will be 8, 12 and 16 weeks.

For grapefruit two temperatures, also, will be used, 33 to 35 F. and 50 to 52 F., also only two picking dates will be used, about March 23 and April 20. Curing will be included. Fruit will come from the upper Rio Grande Valley. Storage periods will be 8, 12 and 16 weeks.

Award to Cold Storage Manager

THE Nebraska City Junior Chamber of Commerce title of "outstanding young man of 1948" has been awarded to Verne Jones, manager of the Omaha Cold Storage Co. plant of Nebraska City, Nebr. Dr. M. B. De Jarnette, who made the presentation, declared "Verne Jones never has said 'no' when asked to perform some community service.

Tax Reduction Granted

THE Omaha Cold Storage Co., Omaha, Nebr., has agreed to a tax settlement with the Omaha Board of Equalization wherein a readjusted valuation of the firm's property is set at $369,900. The board assessed the firm at $429,600, and the company appealed, asking for a reduction of $236,600.

New Executive Committee Members

Four new members were elected to the Executive Committee of the National Association of Refrigerated Warehouses during the 58th Annual Meeting of the American Warehousemen's Association held recently in San Francisco. They are: H. A. Gross, Vice-president, Booth Cold Storage Co., St. Louis; G. F. Dodson, President, Security Warehouse & Cold Storage Co., San Jose; C. E. Simmon, Vice-president, Big 4 Ice & Cold Storage, Oklahoma City; and J. P. Johnson, Vice-president, Terminal Refrigerating & Warehousing Corp., Washington, D. C. In the above photo are Messrs. Johnson, Dodson and Simmon.

Refrigerated Warehousing Industry

Merchandising Through Cost Controls

By W. C. Baker
Produce Terminal Cold Storage Co., Chicago, Ill.

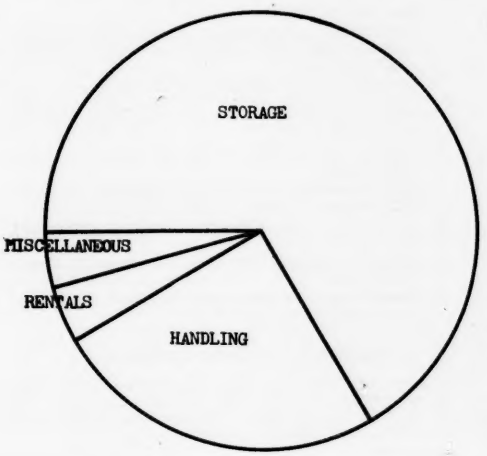
AT PREVIOUS NARW conventions, the subject of costs and tariffs has been assigned to an eminent industry authority but this time, you are in the hands of an amateur. Embarrassing as it is to say this, I feel most unqualified to discuss the intricate subject assigned me for, until just six months ago, our plant operated in complete oblivion to standardized classifications of accounts and standard costs! At that, I don't think I would have been here if some far-sighted warehouseman hadn't asked me to participate in a study to determine if a standardized classification of accounts and standard costs would be applicable to our particular set-up.

At first, I was quite skeptical. Our operations have been successful without these "new-fangled" procedures and, as they fired questions at me, I found our accounting system was quite adequate to answer such questions as:

Where do we get our income dollars?
From: Storage, Handling, Rentals, Miscellaneous.

Where Do We Get Our Income Dollars?

From: Storage, Handling, Rentals, Miscellaneous.



Or to answer such interrogations as:

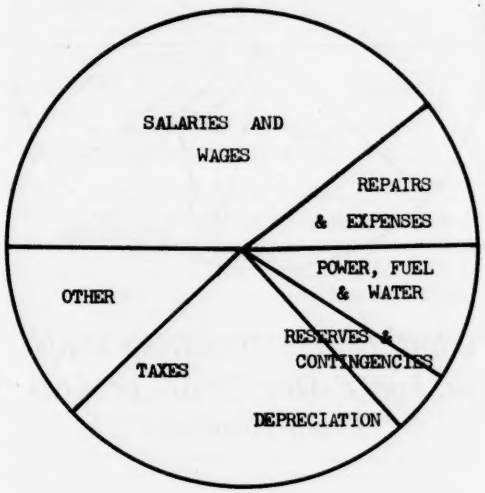
What happens to our income dollars?
For salaries and Wages, Repairs, Water, Reserves and Contingencies, Depreciation, Taxes, Other.

Up to this point, our accounting records readily provided all the data required by the experts. Why should we use this standardized classification of accounts or standard costs when our existing records suffice? But then, when they began to correlate questions one and two, complications arose.

Summary of remarks at annual convention National Association of Refrigerated Warehouses.

What Happens to Our Income Dollars?

For Salaries and Wages, Repairs, Water, Reserves and Contingencies, Depreciation, Taxes, Other.



Since we so easily determined what percentage of our income dollar was handling and what percentage was storage, it should normally follow that our records should indicate from what source our profits came. The next question was:

What part of our income dollar was spent to handle the commodity? To store it?

What is our handling profit or loss? Our profit or loss from storage?

To make a long story short, these were the beginning of a long series of questions which we were unable to answer from our accounting records. Nevertheless, we had to find a "way" to adapt our records in order to answer these pesky questions, so the reference department went to work.

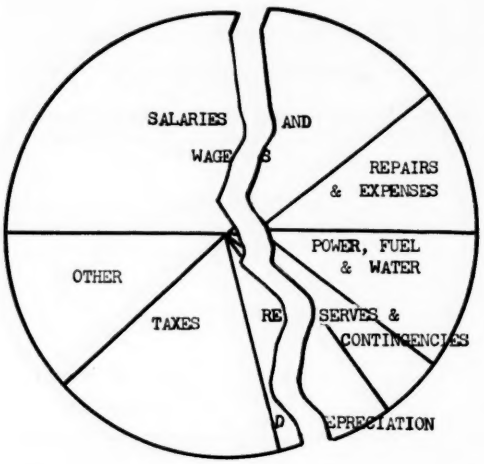
Finally, we were able to dig up a reference in one of the American Warehousemen's Association Annuals which referred back to an old manuscript of 1921 called, "Standardization of Basis for Rates." This work divided operation costs into two categories, storage and handling, and provided the basis under which we were able to segregate our accounts in our bookkeeping system.

Our investigation of standard accounting bases resulted finally in the following analyses:

Standardization of Basis for Rates

This is an excerpt from the proceedings of the Fifty-sixth Annual Meeting of the American Warehousemen's Association, January 15 to 17, 1947 of remarks made by Mr.

What Part of Our Income Dollar Was Spent to Handle The Commodity? To Store It?



What Is Our Handling Profit or Loss? Our Profit or Loss From Storage?

H. W. Wilson of Philadelphia. Mr. Wilson was quoting from the pamphlet, "Standardization of Basis for Rates" prepared by the Central Bureau Committee of the AWA in 1921.

The standardization of basis for rates divides costs intc two main groups—storage and handling. Under storage, in relation to land, buildings and storage equipment are the following cost items:

Interest on investment
Depreciation and obsolescence
Fire insurance
Repairs
Taxes
Advertising
Fuel
Power
Water
Ammonia, calcium, etc.
Miscellaneous supplies and expenses
Wages and wage taxes of: (1) Watchmen, (2) Engineers, (3) Maintenance men
40 per cent of overhead or Administrative expenses

Under handling, in relation to handling equipment, are the following **cost items:**

Interest on investment
Depreciation and obsolescence
Fire insurance
Repairs and taxes
Power and light on elevators, trucks, scales, tools, etc.
Miscellaneous supplies and expenses
Productive labor
Non-productive labor including Holiday time, idle time, sick leave, etc.
Taxes on handling labor wages
60 per cent of the Administrative expenses

Suggested List of Expense Items to be Included in Handling

This is a preparation by a Chicago Group Committee revised, and indicates specifically a break-down of handling accounts assuming the use of standard costs.

To facilitate the segregation of handling costs from storage costs, and assuming the use of standard costs, the following items of expense should be included in handling:

I. Direct Labor—include the Standard Cost of touch labor only.

II. Burden.

A. Payroll items.

1. Unabsorbed Labor—the difference between the wages paid for handling during a period and the amount determined by the application of Standard Costs.
2. Wages paid:
   (a) Superintendent—50% of the salary of the person in direct control of the foreman of the Handling Department.
   (b) Dock and house foremen.
   (c) Elevator men.
   (d) Janitors.
   (e) Dock clerks who prepare records of receipts and deliveries.
   (f) Office clerks who keep records of customer's goods, receive and prepare orders for delivery, prepare acknowledgments, warehouse receipts and post inventory records.
   (g) Traffic manager and traffic clerks where the function is solely the control of goods to and from the warehouse.
3. Miscellaneous payroll items.
   (a) Taxes for FOAB and State Unemployment Compensation on above wages.
   (b) Vacations, idle time, sick leave, etc., for which above employee is paid.
   (c) Workmen's Compensation, Public Liability Insurance, Group Insurance, Pension Plan on above personnel.

Other than payroll items.

1. Depreciation, maintenance and repairs on handling facilities—docks, platforms, elevators, switching tracks, etc.
2. Depreciation, maintenance and repairs on handling equipment—warehouse trucks, tractors, fork lift trucks, batteries, battery charging equipment, scales, etc.
3. License and inspection fees on elevators, switch tracks, etc.
4. Insurance and personal property taxes on handling equipment, etc.
5. Power for lights, elevators, charging equipment, etc.
6. Handling supplies and materials—exclude sales to customers.
7. Demurrage and switching—exclude charges to customers.

Suggested Handling Accounts

This is a suggested list of handling accounts to be used for Standardization of Accounts, whether Standards are used or not. By using such a classification, storage and handling profits can readily be determined.

1. *Supervision*
   50% salary paid plant superintendent; all of salaries or wages paid dock and house foreman.
2. *Direct Labor*
   Wages paid employees handling or performing a receiving or delivery function. This includes warehouse labor, checkers and elevator men.
3. *Indirect Labor*
   Salaries and wages paid dock clerks, office clerks, traffic manager, traffic clerks and janitors whose function directly pertains to handling processes but not as direct (or touch) labor.
4. *Unabsorbed Labor*
   Vacations, idle time, sick leave and any other wages paid to employees directly or indirectly involved in handling processes that cannot be specifically allocated in any other handling cost account.

5. *Payroll Taxes*
FOAB and State Unemployment Compensation on handling cost accounts considered above.

6. *Insurance, Compensation and Public Liability*
Group Insurance, Pension Plan, Workmen's Compensation, Public Liability Insurance, etc.

7. *Power*
Electric power to operate lights, elevators, charging equipment, etc.

8. *Supplies*
Cost of supplies and materials necessary for handling, other than those purchases for use and subsequent billing to customer's account—i.e., straw, paper, bracing, dunnage, etc.

9. *Demurrage and Switching*
Exclude charges to customers.

10. *Maintenance, Facilities and Equipment*
Labor and material costs paid in maintenance and upon repair of docks, platforms, elevators, switch tracks, warehouse trucks, tractors, fork lift trucks, conveyors, scales, etc.

11. *Depreciation*
Amortization of handling facilities and equipment.

12. *Real Estate and Personal Property Taxes*
Taxes (assessed valuation at assessment rate) on handling facilities and equipment.

Storage Rate Bases

This schedule indicates a "tie-in" of package sizes to assumed space income.

I. *Package Density—*
Measure package
Find cubic feet of package
Weigh package or determine net weight (for net weight tariff) or gross weight (for gross weight tariff)
Divide weight of package by cubic feet to find pounds per cubic feet or density.

II. *Pile Density—*
Assume 250 lbs. floor load per sq. ft.
Assume 8 feet maximum pile height
Then, package densities (less 10% for loss of density in pile) are grouped per following table:

	Pounds per sq. ft.		Pile Height		Pounds Per Cu. Ft.
A	250	divided by	8	=	31.25
B	200	divided by	8	=	25.
C	150	divided by	8	=	18.75
D	100	divided by	8	=	12.50 as

II. *Space Earning* average of under 18.75

Assume net piling square feet are 75% of Gross Refrigerated square feet.
Assume expected occupancy of net piling area is 60%.
Assume as a basis of space earning $1.00 per sq. ft. of gross refrigerated space per year; then $1.00/.75 gives $1.33 per sq. ft. of net piling space; then $1.33/.60 gives $2.22 per sq. ft. per year of occupied space; and $2.22/12 gives $0.18½c per month. Hence, any multiple of $1.00 per sq. ft. of gross refrigerated space per year may be applied to $0.18½ to give the required earning per sq. ft. per month of occupied space.

	Weight per Sq. ft.		Height		Density
A	250	divided by	8	=	31.25
B	200	divided by	8	=	25.
C	150	divided by	8	=	18.75
D	100	divided by	8	=	12.5

The rate per 100 lbs. of product in storage then depends on the density of the package as follows:

And the storage rate per 100 lbs. per month to earn any wanted storage return on gross refrigerated space per year may be expressed as shown in the following tabulation:

DENSITY	A 31 lbs. and up	B 25 lbs. and up	C 18½ lbs. and up	D Under 18½ lbs.
Storage earned per year per gross refrigerated sq. ft.				
$0.80	.06	.075	.099	.15
1.00	.074	.0925	.123	.185
1.20	.088	.11	.1475	.222
1.50	.11	.14	.185	.2775
1.75	.13	.16	.215	.324
2.00	.148	.185	.247	.37
2.20	.163	.204	.27	.407
2.50	.185	.23	.3075	.4625

This table is on basis of 1 sq. ft. gross refrigerated space provides 45/100 of 1 sq. ft. gross as revenue earning space at 60% occupancy of 75% of gross as operating space.

At first, I thought, "What difference does it make? Why should we adopt these standardized accounts and standard costs; after all, we're making money!" But then, they said that good management ought to know whether handling operations are profitable or not, and *how much!* A good accounting system should not only tell how much is made on the storage and handling operations but it should tell *where* the profit or loss occurred.

Why Know Costs

Then when they asked more questions, this time about general business, I began to see how important it is becoming to know our costs.

1. Do you believe commodity prices are too high?
2. Do you believe labor and material costs are still rising?
3. Do you think storage customers fear current conditions? Are they skeptical of heavy inventory?
4. Do you think average storage occupancies will no longer maintain their high percentage levels?

WHAT DOES THIS MEAN TO ME?

Since I had answered "yes" to all of their questions, my own answers seemed to point to less income and higher costs. It does seem to look as though we've come to the end of the gravy train's scheduled trip. I had always suspected that, but so what? I can always increase my rates. . .

That's when they jumped down my throat. "That's no longer the way out! Think of your poor customer! How much cost can he stand? How much more can he pass on to the ultimate consumer? And, anyway, if you're determined to raise your rates, which rates are you going to raise? Can you tell from your records what commodities are carrying the pay load and which ones are costing you dough?"

But what can be done about these rising costs? If I can't raise my rates, could I reduce my costs? But how? Wouldn't it be easy if I knew in advance how much and how fast these nasty costs were rising? Of course, I might have a better idea if I kept better accounting records. I guess my records aren't so good, after all. Mebbe I could control costs a bit through an improved accounting system? And mebbe, I could increase my operating efficiency through the newfangled thing they call standard costs?

Rate				
$0.185	divided by	2.50	=	$0.074 cwt.
$0.185	divided by	2.00	=	0.0925 cwt.
$0.185	divided by	1.50	=	0.123 cwt.
$0.185	divided by	1.00	=	0.185 cwt.

We're talking about "Merchandising Through Cost Control," so may I tell you about this ethereal thing that they call "merchandising" as it applies to our operations?

If you were a sales manager selling a machine, the first thing you would want your salesman to know would be

every little thing about that machine. You would train him for months to learn how it was built, how it runs, how to repair it, how much it cost to manufacture and how much to sell it for. In innumerable sales offices you will find the slogan, "Know Your Product."

This same dope, in a modified form, applies to tariffs and costs. And, do you know, gentlemen, I found out that I just don't know those simple basic facts about the services that we, as warehousemen, sell. Why I couldn't even answer such questions as these:

Knowing Service

As the salesmanager wants his salesman to KNOW HIS PRODUCT, so should I KNOW MY SERVICE.

1. Do I know how much it costs to handle each commodity in and out of storage? (If I did, I could express it to you in terms of costs per man hour per cwt.)

2. Do I know how much it costs to store each commodity placed in the freezers or coolers? (If I did, it would be expressed in terms of cost per cwt. per cubic feet of net piling space.)

3. Do I know how the current tariff rates compare with actual costs? (If I did, I would know which commodity is paying their "freight" and which ones are breaking my back.)

4. Do I know how efficiently the freezer-men, the cooler-men and the receiving and shipping crews are working? (If I did, I would first have to have a common demoninator to judge their efficiency by . . . and this common denominator is standard costs.)

If I could only answer "yes" to all of these questions, I could shout out that I know my costs and that I know where to increase my efficiency and that I have the key to continuing profits. But I don't . . . not yet.

So I have attempted, in my own little way, to find out! To get on the ball and find the best way I know to install a properly classified accounting system and standard cost set-up.

Production Standards

In checking up on this complicated thing they call a standard cost system, I found that production standards are only measures, in time, of how long it should take to perform a particular operation—and average time that it takes to perform a particular job. Once established, this standard becomes the basis for cost determination and once analyzed and acted upon these standard costs become the key to more efficient operations.

Production standards and measurement by time study have been accepted by industry, generally, in the last 25 years but more widely since the beginning of the War, as one of the fundamental tools of modern management.

We have this tool in our kit today but it would be idiotic for me to tell you that, in a few short months, we have learned how to use it and have all the answers. Some of those present here have been using production standards for many years, and while they subscribe to the use of this tool and to the benefits derived therefrom, they probably do not pretend to have reached perfection.

Remember, gentlemen, if I hadn't asked myself a few introspective questions, I might easily have stood up here before you and effectively argued that our accounting system was tried and true—that we could get any bit of information from it (with a certain amount of digging around) and that our house is small enough that our very capable superintendent could see each and every operation. Just a short time ago, I would have been inclined to do this, but now I am a little wiser.

Benefits from Standards

Where we are getting some benefits from standards—and we plan to get more—might be of interest to you.

1. We have come to the realization that we cannot afford to be satisfied with our operations, despite the fact that we think they are pretty good.

2. To improve our operations, we have learned to localize our troubles. Standards definitely assist us in doing this. For example, a daily report quickly tells us the efficiency of our dock crews and compares it with the efficiency of the freezer and cooler men. Each having handled the same daily volume, we can judge where slow-downs occur, where bottlenecks are and where to direct our efforts for improvement.

3. We have found that inefficiency in over-all performance is not wholly the fault of labor but also of management which is responsible for taking the proper steps to eliminate the various causes of delay.

4. Our standards have made us more "flow" conscious than we ever were before. We had thought that our men were pretty good in this regard—and most of them were, but standards have pointed out to us where our supervision must be on hand to expedite this "flow."

5. We now have the conviction that there must be a better way to do almost every operation currently performed. The mere fact that our forefathers did it a certain way is pretty definite proof that we should be able to improve upon it. We are not using mechanical handling equipment, nor are we considering a complete mechanized rejuvenation, however; our standards have pointed out that mechanization would be helpful in certain specific operations.

6. We now know what it costs us to handle small orders and whether our tariffs are sufficient to cover these handling costs.

7. We are finding ways to reduce the waiting time of trucks at the docks through better planning and scheduling—not of the trucks, because we have no control over their movement—but over our internal operations in eliminating as much of the internal delay as possible.

8. In our old method, we were tickled pink to take the profits as the residue, the remainder—that difference between our income (resulting from current tariff rates) and our costs of operation . . . but under a well controlled cost system, we are hopeful of limiting our expenditures in direct relation to our income to that profit is not a chance proposition but is assured as the result of good management and cost control.

Costs have risen faster than tariff rates. This results in a higher break-even point so, as incomes decline, that red figure is going to appear much quicker on our statements. I believe we will need all the control data we can get to keep our operations in the black.

To effect the use of standard costs requires some expenditure of funds. We're still experimenting to find out how much information is profitable and worth-while and how much is inconsequential and unnecessary. However, our cost of establishing and maintaining a standard cost system is proportionately quite small and we believe that the data derived therefrom will be many times worth its cost.

Understand, I feel most unqualified to discuss this subject because we have just started its application.

Theoretically, it's excellent and so far, practically, we have no complaints. We have found that a standardized classification of accounts is a big help in determining our costs . . . and that standard costs do work!

We have found that:

1—A standard classification of accounts is a big help in determining our costs!

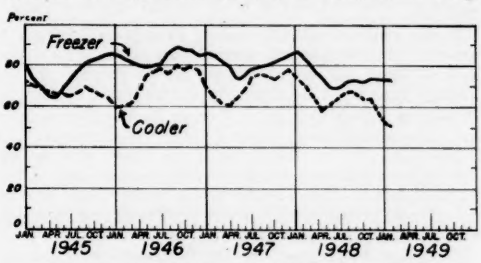
2—Standard costs do work!

Refrigerated Warehousing Industry

Cold Storage Holdings—Big Decrease for Both Coolers and Freezers

OCCUPANCY of both coolers and freezers in public cold storage warehouses on February 1 was below average. Coolers were 52 per cent occupied, 14 points below average, while freezers, 71 per cent occupied, were 12 points below average. The decline of 2 points in public cooler occupancy and 1 point in freezer occupancy during January was less than the 5-year average decline in occupancy for this time of year. Coolers and freezers in private and semi-private warehouses were 53 and 62 per cent occupied, while meat-packing plants reported both coolers and freezers 85 per cent occupied on February 1. The greatest use of freezer space was reported by Milwaukee, Minneapolis, St. Louis, Omaha, Baltimore, New Orleans, and Houston, which reported occupancies of 90 per cent or more. Coolers were more than 80 per cent filled in Omaha and San Antonio.

Total weight of foodstuffs in storage on February 1 totalled 3.4 billion pounds. Cooler commodities amounted to 1.8 billion pounds while foodstuffs in freezers totalled 1.6 billion pounds. During January, there was a net withdrawal of 274 million pounds of foodstuffs from coolers and 17 million pounds from freezers. This compared with a net withdrawal from coolers of 347 million pounds last year this time and 22 million pounds from freezers for the corresponding date. The reduction in stocks of fresh apples and pears accounted in the main for the net decrease in cooler weight while the net decrease in freezer weight is attributable to the withdrawals of all freezer items except beef, pork, edible offal, lard and rendered pork fat which showed seasonal increases.



Occupancy in Refrigerated Warehouses 1945-1949

Approximately 13 million bushels of apples were in storage on February 1. This compares with 23 million bushels last year and the average February 1 holdings of 19 million bushels. During January there was a net withdrawal from storage of 5 million bushels which is about equal to the 5-year average net change in holdings and the withdrawals last year this time. Pears in storage were about one million bushels less than the stocks on hand last month. The 951 thousand bushels of pears were below average by 46

TABLE I—COLD STORAGE HOLDINGS IN PUBLIC WAREHOUSES—BY COMMODITIES (000 OMITTED)

	Feb. 1, 1949	Jan. 1, 1949	Feb. 1, 1948	Five-year Average
Meat and meat products, lbs.	890,732	762,887	996,133	775,331
Lard and rendered pork fat, lbs.	161,857	116,397	133,513	133,904
Frozen poultry, lbs.	148,466	160,834	293,640	285,982
Creamery butter, lbs.	19,469	33,615	13,399	46,586
American cheese, lbs.	116,427	126,534	107,236	111,531
Other cheese, lbs.	15,837	18,146	14,718	16,550
Shell eggs, cases	145	159	269	378
Frozen eggs, lbs.	72,195	104,932	122,438	99,131
Apples, bu.	12,962	17,813	23,339	18,907
Frozen fruits, lbs.	318,301	335,940	343,539	319,430
Frozen vegetables, lbs.	262,906	281,825	254,853	212,590
Frozen fish	127,411	150,974	112,046	103,771

TABLE II—PERCENTAGE OF SPACE OCCUPIED BY PUBLIC COLD STORAGE WAREHOUSES (APPLE HOUSES EXCLUDED)

	Net Piling Space (000 cu. ft.)		Feb. 1, 1949 (%)		Jan. 1, 1949 (%)		Feb. 1, 1948 (%)		5-Year Average (%)	
	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer
New England	3,561	6,327	41	75	34	76	57	82	61	77
Middle Atlantic	42,086	33,798	50	66	53	71	68	84	67	86
East North Central	36,040	28,304	52	73	51	73	72	87	61	83
West North Central	11,006	16,733	55	85	59	78	74	91	67	81
South Atlantic	11,634	6,368	52	82	56	78	66	86	67	88
East South Central	4,199	3,847	62	86	60	88	76	83	72	83
West South Central	7,241	5,195	63	69	67	74	70	83	67	90
Mountain	2,150	2,707	49	64	41	50	70	85	67	91
Pacific	18,936	21,462	54	62	59	64	66	77	65	78
United States	136,853	124,741	52	71	54	72	69	84	66	83

TABLE III—PERCENTAGE OF SPACE OCCUPIED BY PRIVATE AND SEMI-PRIVATE REFRIGERATED WAREHOUSES AND MEAT PACKING PLANTS

	Private and Semi-Private Warehouses						Meat Packing Establishments					
	Net Piling Space (000 Cu. Ft.)		Space Occupied—Per Cent Feb. 1, 1949		Space Occupied—Per Cent Jan. 1, 1949		Net Piling Space (000 Cu. Ft.)		Space Occupied—Per Cent Feb. 1, 1949		Space Occupied—Per Cent Jan. 1, 1949	
	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer
New England	554	1,113	44	85	48	80	1,968	725	86	100	88	100
Middle Atlantic	3,293	4,430	34	60	45	73	6,731	740	87	65	76	57
East North Central	5,779	2,576	82	61	82	72	15,885	6,591	73	75	77	60
West North Central	2,123	3,929	66	70	80	77	25,718	10,549	90	87	90	83
South Atlantic	647	1,377	23	65	.....	40	2,377	609	95	99	94	99
East South Central	190	101	100	100	100	100	2,014	403	54	90	53	86
West South Central	700	764	35	.....	37	.....	3,570	1,452	97	99	96	100
Mountain	182	654	78	55	86	89	2,028	666	95	99	94	98
Pacific	5,383	6,554	33	63	55	72	4,056	1,152	92	93	94	91
United States	18,851	21,498	53	62	62	69	64,347	22,887	85	85	85	78

thousand bushels and were more than half a million bushels below the February 1, 1948 holdings.

The net change in frozen fruits and vegetables during January was below average. A total of 18 million pounds of frozen fruits and 19 million pounds of frozen vegetables were withdrawn from storage during January whereas the average January to February decrease is 23 and 21 million pounds respectively. Current holdings of frozen fruits amounting to 318 million pounds are about equal to the average February 1 holdings of frozen fruits. All frozen vegetables, except for broccoli and cauliflower were withdrawn from storage during January. First-of-the-month stocks totalled 263 million pounds which is about 50 million pounds greater than average February 1 stocks and some 8 million pounds more than stocks on hand last year this date.

Cream stocks totalled 24 million pounds on February 1, which is 10 million pounds greater than stocks on hand this date last year and about 6 million pounds greater than the average February 1 holdings. Creamery butter in store of 19 million pounds was below average for this time of year but exceeded last year's holdings by 6 million pounds.

The reduction in cheese stocks was about average for this time of year and as of February 1 amounted to 135 million pounds. These stocks are, however, some 11 million pounds greater than last year's holdings and exceeded average February 1 stocks by 6 million pounds.

Shell egg stocks, down to 145 thousand cases, are the lowest February 1 holding since 1940. Frozen eggs, also below average, were reduced by 33 million pounds during January and on February 1 stood at 72 million pounds.

There are some 12 million pounds less frozen poultry in store this month than last month. Current holdings are 145 million pounds below last year's stocks and 138 million pounds below the 5-year average February holdings.

Less than average increase in beef holdings during January raised total beef in store to 152 million pounds which is some 27 million pounds below average and 24 million pounds less than stocks on hand last year this date. Frozen pork on the other hand increased by 118 million pounds which is 18 million pounds greater than the average January to February increase. Pork on hand February 1 totalled 587 million pounds, more than half of which was frozen pork. Present pork holdings exceed average February 1 stocks by 85 million pounds but are 72 million pounds below the volume of pork on hand at this time last year.

A net out-of-store movement of 24 million pounds during January brought frozen fishery products down to 127 million pounds on February 1. Total frozen salt-water fish in store amounted to 96 million pounds; fresh-water fish, 11 million pounds; shellfish, 20 million pounds. Reduction in holdings of miscellaneous fillets, halibut, and shrimp account for more than half of the fishery products moved from store.

Storage Outlook

With coolers 52 per cent occupied on February 1 it appears that little difficulty will be encountered in meeting the storage requirements in coolers for cheese, shell eggs and lard when they move into store during the spring and summer months. The net out-of-storage movement of fresh apples and pears during the month should further reduce cooler occupancy. Based on previous records the February to March change, usually a drop of 1 point, brings cooler occupancy to the low-point for the year.

It is expected that freezer occupancy will decline further during the month as creamery butter, frozen vegetables, fruits, and poultry move from store. These net out-of-storage movements will be counterbalanced by net increases of frozen egg stocks and frozen meat products. Average occupancy on March 1, however, is generally 2 to 3 points less than the preceding month. If the average net change is experienced during February then freezer occupancy on March 1 will approximate the occupancy level evidenced on March 1, 1945.

Cold Storage Stocks of Frozen Fruits and Vegetables

RETAIL packages of frozen peaches, raspberries, and strawberries made up a little less than a fourth of the frozen fruits classified as to container size on February 1 according to a report issued by the Production and Marketing Administration of the U. S. Dept. of Agriculture. There was little change, however, from the percentage of one-pound packages reported last month. At this time last year approximately 28 per cent of the selected frozen fruit stocks were reported as being in retail containers. Packaging data on February 1, covering 66 per cent of the frozen peaches, 84 per cent of the frozen raspberries and 71 per cent of the frozen strawberries showed that these three fruit items in one-pound containers were in the same ratio to stocks on hand as they were last month.

COLD STORAGE STOCKS OF FROZEN FRUITS AND VEGETABLES IN STORAGE FEBRUARY 1, 1949 IN PACKAGES OF ONE POUND OR LESS (000 OMITTED)

	lbs.	%		lbs.	%
Peaches	4,180	32	Beans, lima	15,880	56
Raspberries	2,262	12	Beans, snap	8,230	68
Strawberries	14,587	27	Corn, sweet	5,300	48
Asparagus	1,723	54	Peas, green	27,781	57
			Spinach	3,477	77

Slightly more than half of the stocks of the six frozen vegetables surveyed were classified as to container size for the February report. Of the total classified, 58 per cent were reported in packages of one pound or less. This compares with 58 per cent last month and 53 per cent this time last year. Relatively more of the frozen spinach on hand was in retail-packages than for any other vegetable item, with 77 per cent being reported in this type of container. Frozen snap beans followed next with 68 per cent. This time last year only 50 per cent of the reported snap beans were in retail packages. Frozen peas in consumer-units comprised 57 per cent of the peas classified as to package size, down 2 points from last month, but 4 points above the percentage reported in February 1948. Consumer-sized containers of lima beans, now at 56 per cent of the stocks classified, was unchanged from last month while frozen asparagus in one-pound packages dropped from 56 to 54 per cent.

Canadian Cold Storage Holdings

THE Dominion Bureau of Statistics of Canada, Agricultural Branch, reports the following commodities, held in cold storage on February 1, 1949 as compared with February 1, 1948 and January 1, 1949.

Apples in cold and common storage on February 1, 1949, amounted to 2,090,029 bu. as compared with 3,415,751 bu. February 1, 1948 and 3,290,593 bu. January 1, 1949.

Frozen fruit holdings in storages and factories February 1, 1949 amounted to 14,529,000 lbs. as compared with 11,767,000 lbs. February 1, 1948 and 15,865,000 lbs. January 1, 1949.

Stocks of frozen vegetables in storages and factories on February 1, 1949 amounted to 5,208,000 lbs. compared with 4,998,000 lbs. February 1, 1948 and 5,986,000 lbs. January 1, 1949.

Refrigerated Storage of Dried Fruits

A PRELIMINARY report on a study of refrigerated storage of dried fruits was presented by W. T. Pentzer at the annual meeting of the Refrigeration Research Foundation held at San Francisco, February 6. The report was based on a project aided by T R R F and conducted by the Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Dept. of Agriculture, under the leadership of Mr. Pentzer at Fresno, Calif., during the years 1944-46. The California Dried Fruit Association was an interested and active cooperator in this work. The project was also aided financially by the Subsistence Research and Development Laboratory of the Quartermaster Corps of the U. S. Army.

General Conclusions

Storage of dried fruits at approximately 32 F. with 40 F. as an approximate upper limit, and also at low humidity, is of sufficient value to the dried fruit industry generally to justify such storage as standard year-round practice.

Low-temperature storage controls browning, particularly for dried apricots and peaches, but also for apples, pears and nectarines, and even for whole fruits such as prunes and figs.

At the low temperatures mentioned, insects such as raisin moths and dried fruit beetles, which commonly infest dried fruits, are dormant and are gradually killed.

Flavor, texture, color and vitamin content of dried fruits are protected notably and significantly at low temperature.

Low humidity controls sugaring, both externally, and internally, which affects raisins, figs, and prunes and to a minor extent, apricots.

Avoidance of high humidity and in some instances of even moderate humidity is necessary to prevent mold and sugaring. For this reason a temperature of about 31 or 32 F. is safer and better than 40 F.; however, low humidity is important at 31 to 32 F. as well as at higher temperatures of 40 F.

Industrial Practice

In 1946 slightly over a fourth of the 500,000-ton crop of dried frutis was stored in refrigerated warehouses in the United States and it seems obvious that larger amounts will be cold-stored in the future. General opinion among storers and storage men is that the low-temperature storage and handling are highly successful and beneficial. The reasons why cold storage of dried fruits had increased only recently are, (1) previous lack of demonstration of its value and (2) unawareness on the part of the food industries of the benefits to be gained. Technical demonstration and experience have shown that dried fruits are better if they are held at low temperature and in adequately dry atmosphere from production to consumption.

Research Results in Brief

Tests were conducted with fruits in commercial fiberboard containers holding 25 or 30 lbs., with the exception of apples which were in wooden boxes holding 50 lbs. Temperatures used in the tests were 32, 40, 55, 75 and 90 F. Low and moderate humidities (55 and 80 per cent relative) were compared at 32 and 40 F.

Raisins: At 32 and 40 F., sugaring was prevented for well over a year at low relative humidity, provided the moisture content of the dried fruit was not unusually high. These temperatures are also effective in the control of insects. Keeping raisins in an atmosphere of low moisture content is important; for purposes other than insect control, low humidity is more important than low temperatures. Raisins usually contain 15 to 20 per cent moisture; for extremely long storage a lower moisture content would be an advantage.

Figs: At 32 and 40 F. with low relative humidity figs kept well for more than a year. At 55 F. and higher temperatures they darkened within five months. Low humidity controls sugaring.

Prunes: At 32 and 40 F. with low humidity prunes kept well for over a year, in excellent condition. For storage of four to five months a moderate humidity was not objectionable.

Apples: At 32 and 40 F. with low humidity excellent color and texture were retained for a long storage period. A relative humidity of 80 per cent was not objectionable at 32 but at 40 F. enough moisture was gained to cause the fruit to mold within eight months. During a period of 8 months 55 F. resulted in only slight browning but considerable mold because of high humidity (85 per cent).

Pears: Results were most desirable at 32 and 40 F. with low humidity. At 55 F. there was a slight darkening during long storage.

Peaches: With sun-dried freestone peaches, results were best at 32 F. with low to moderate relative humidity. At 40 F. with moderate humidity, moisture pick-up was too great. A temperature of 55 F. permitted darkening. Clingstone peaches (dehydrated after steam scalding) withstood higher humidity than the freestone fruits at comparable temperatures. Otherwise they behaved similarly to freestones.

Apricots: At 32 F. with either low or moderate humidity, dried apricots remained in excellent condition. At 40 F. with moderate humidity there was enough gain in moisture content to be somewhat objectionable.

Varieties used in these tests were Thompson Seedless raisins, Adriatic figs, French prunes, Gravenstein apples, Muir freestone peaches and Blenheim apricots. The findings are reasonably assumed to be applicable to other varieties of the same fruits.

Keeping Good Eggs Good

REFRIGERATED eggs can be good—if the eggs are good when they go into storage. And what are the measurements of a good egg for storage? They were outlined by Dr. Mary E. Pennington, refrigeration consultant, New York City, at the Institute of American Poultry Industries' Fact Finding Conference in Kansas City February 7.

First of all, reported Dr. Pennington, the egg must be young—get it from the hen to the cooler in the shortest possible time, with a minimum of handling, and cool it rapidly.

Secondly, it must be clean—and that doesn't mean washed. Both dirty and washed eggs are prolific sources of bacterial rots and mold infestations.

Oiled eggs can go into the cooler immediately, but they must be oiled properly. Dirty oil, for example, can cause trouble, and oil will not penetrate the shell if it is wet, so eggs must be dry when they are oiled.

Fillers and flats must be new.

Refrigerated storage temperatures should be 30 F., or from 29 to 31 F. Humidity must be high, it can be over 90 per cent if the temperature is held between 29 and 31 F. and there is good air circulation around all cases.

With our increased fall production, Dr. Pennington pointed out, six months is about as long, at the present time, that any volume of eggs must be stored. And if clean eggs of top interior quality are properly packaged and refrigerated, loss from deterioration should be less than one per cent at the end of six months. Otherwise, losses can run as high as 15 per cent under certain circumstances.

Frozen Foods
Reg. U. S. Patent Office
COVERING EVERY PHASE OF THE QUICK FREEZING OF PERISHABLE FOODS—PREPARATION, PACKAGING, FREEZING, STORAGE, DISTRIBUTION, DESIGN, CONSTRUCTION, EQUIPMENT, OPERATION OF LOCKER PLANTS.

Frozen Food Industry Holds Joint Convention and Exposition

CONSUMER acceptance of frozen food products reached a new high last year and is continuing to have marked advances throughout the country, according to leaders in the industry who held a four-day convention and exposition March 7 to 10 in the Stevens Hotel, Chicago. An outstanding theme of the convention was the importance placed upon maintenance of high quality. In the words of F. J. Becker, president of the National Association of Frozen Food Packers, "the customers demand and we must supply top quality. As long as we do that we will grow and when we do not, we will stop growing. It is as simple as that."

All segments of the industry were represented including the packers, distributors, brokers and retailers. Sponsoring organizations were the National Association of Frozen Food Packers, National Wholesale Frozen Food Distributors, Inc., National Association of Refrigerated Warehouses, National Preservers Association and National Food Brokers Association.

Aside from the regular program there were displays of latest developments in the frozen foods industry in the Exhibition Hall at the Stevens Hotel from March 7 through March 10. Virtually every type of frozen food packing was on display.

Survey of Housewives

A report on a nation-wide survey on "What the American Housewife Thinks of Frozen Foods" highlighted the opening session of the National Wholesale Frozen Food Distributors. It revealed that the homemaker is buying frozen fruits, vegetables, fruit juices, seafoods, poultry, meats and specialties in greater quantities than ever before. The survey covered personal interviews with more than 2,400 housewives, representing all income groups, in 34 cities and towns throughout the nation.

Approximately three-fourths of the women interviewed (actually 76 per cent) reported that they buy frozen foods. And nearly two-thirds (64 per cent) told the interviewer that they serve frozen foods once or more a week. It was shown that vegetables are more in demand than any other commodity by buyers of frozen foods. Next to vegetables, housewives seem to prefer fruits, fish, poultry and meat, in that order. This survey was the first of its kind in the history of the frozen foods industry. It was presented by Ray Robinson, director of research for the Crowell-Collier Publishing Co.

Officers and Directors—1949
National Association of Frozen Food Packers

President, A. J. Rogers, Cherry Growers, Inc., Traverse City, Mich.

First Vice-president, E. J. Watson, Pictsweet Foods, Mt. Vernon, Wash.

Second Vice-president—C. O. Bailey, Birdseye Snyder Div., General Foods Corp., New York City.

Directors: E. A. Thornton, Geo. W. Haxton & Son, Inc., Oakfield, N. Y.; C. S. Meister, Fairmont Canning Co., Fairmont, Minn.; R. O. Dulaney, John H. Dulany, Fruitland, Md.; N. W. Cedargreen, Cedargreen Frozen Food Corp., Seattle, Wash.

Frozen Food Distributors

The opening session of the National Wholesale Frozen Food Distributors was held at the Congress Hotel, Monday morning, with discussions of profits, trends in frozen food distribution, how distributors can cut costs, report on the survey of housewives and the important contribution to postwar recovery made by orange juice concentrate.

Harry K. Schauffler, executive director, said that frozen foods in a few short years may assume a dominating position in the thirty odd billion dollar food market of America. But, there is small chance of this happening, he said, unless all members of the industry are big enough to promote their own best interests by pulling together for the industry's progress. One of the things the industry and consumers must realize is that frozen foods are no longer luxury items beyond reach of the mass market. Another change, he said, is the tendency of consumers to buy frozen food in quantities and store them in home freezers. He pointed out that if all home freezers at this time happened to be empty, the entire 1949 retail pack would not quite fill them all to capacity.

Philip Lyons of Pictsweet Foods, Mt. Vernon, Wash., discussing the trends in frozen food distribution, said that with the war and postwar conditions behind, the frozen food industry is now entering into a period of more normal conditions. This is going to be a period, he said, in which consumers are going to watch their buying dollars more

carefully and when the cost of production and sales price will move more closely together.

Another factor is the change in packaging through which old established brands as well as new are establishing new designs for their labels which will make the packages more attractive and offer more pick-up appeal for consumers. These trends will affect every factor in the frozen foods business whether it be the packers, distributors or retailers.

Unexpected public acceptance of frozen food orange concentrate has had a remarkable effect upon the industry according to Ambrose E. Stephens, vice president of Vacuum Foods. As a product it is only two years old, yet in the last six months it has seen a tremendous increase in production as well as unparalleled sales in the frozen food industry. This year in Florida Mr. Stevens predicts that frozen orange juice concentrate will absorb 10,000,000 boxes of oranges, or more than one out of seven of the state's huge production. He pointed out that its value to distributors and retailers lay in the fact that this product added to volume and new profits to frozen foods without duplicating or supplanting volume and profits already enjoyed.

One reason the public has taken such a fancy to this new product, Mr. Stevens continued, is that aside from its obvious convenience it is more uniform in flavor, and, for about nine months of the year, it is cheaper yet having equal vitamin content with fresh. It is estimated that a six million gallon pack will be required to meet public demand for this product in 1949.

Frozen Food Packers

The initial meeting of the National Association of Frozen Food Packers was held at the Stevens Hotel, Tuesday morning, with reports to the industry from representatives of the various company associations representing the distributors, the packers, the preservers, and National Association of Refrigerated Warehouses and the American Warehousemen's Association.

A Warehousemen Looks at the Frozen Food Industry

Reporting for the refrigerated warehousing industry, Edgar M. Burns, past president of the National Association of Refrigerated Warehouses, said that the NARW is now stressing cooperation within the industry and is embarking on a vigorous campaign of public relations to acquaint the public with the facts and inter-workings of the industry, and with their ideals of service. They intend, he said, that the old aversion to "cold storage" goods shall be overcome and that the great value of refrigeration in the preservation of foods shall be fully appreciated. In this connection he called attention to the excellent work being done by the Refrigeration Research Foundation under the leadership of Dr. H. C. Diehl.

In Dr. Diehl's plans are included intelligent usage of established research facilities and advice and assistance of recognized scientists and food technologists in analyzing and allocating problems presented to the Foundation for study. This plan is producing unexpectedly good results and certainly is of interest to the frozen food industry because so many of the studies have to do with the proper preservation of foods by refrigeration and with their proper treatment in the voyage from producer to consumer.

Mr. Burns suggested the formation of an overall operations committee representing all branches and efforts of the frozen food industry which could meet once or twice a year to consider and study mutual problems and allocate them for study and consideration to the interests best suited for that purpose. This, he said, would be not another association but an evaluated committee which would help all to face along the lines which would be helpful in the development of the frozen food industry.

W. L. Pavlovski, president of the Quick Frozen Foods Association of Chicago pointed out that in the pipeline of frozen foods from producer to consumer there is a vacuum of public information regarding frozen foods. This, he said, should be remedied by publicity. To back up public acceptance, high quality should be placed above all other production problems. This, he said, has been shown by experience. Another essential is knowing how to distribute properly and promptly at not too much cost.

Jean Pestler, Wheaton, Ill. (left) and Lois Teachout, Newtown, Mo., inspect the simulated giant peas on display at the Birdseye booth at the National Frozen Foods Industry convention and show, Stevens Hotel, Chicago, March 7 to 10, 1949.

F. J. Becker, president of the National Association of Frozen Food Packers recalled that the industry had come a long way from the days when fruits and berries were preserved by the cold pack process. The foods refrigerating industry, he said, continues to satisfy the requirements of various food manufacturers, and in addition to the older processes, they are freezing and developing millions of pounds of frozen foods for the retail trade. These products now cover practically the full range of foods including fruits, juices, vegetables, meats, poultry, seafoods, precooked foods and many other specialties. The industry now annually packs and distributes well over one billion pounds of frozen foods in containers ranging from a few ounces to 450 lb. barrels.

While they have come a long way, they are not yet through looking for the right answers. They can never stop looking for improvements in growing and packing methods or efficient machinery, better equipment, faster and more economical production, better containers, improvement in warehousing, transportation and distribution, and improvement in selling to the American consumer. Their customers, he said, will always demand and they must give them, the best possible quality production. If they succeed in this they will grow; if not, they stop growing. It's as simple as that, he said.

While all segments of the industry are working on their problems, all too often Mr. Becker said, they find themselves working at cross purposes and they could save themselves a great deal of effort and much money if they would do something to bring the industry together to unify and coordinate it. To accomplish this unity, he suggested overall industry groups or committees consisting of representa-

tives of all groups that have an interest in frozen foods including packers, preservers, warehousemen, transportation companies, distributors and retailers. These groups, he said, should get together and cooperatively seek the answer to their mutual problems.

Officers and Directors 1949-50

National Wholesale Frozen Food Distributors

President, William M. Walsh, Pittsburgh, Pa.
First Vice-president, Alvin T. Langfield, Oakland, Calif.
Second Vice-president, Albert Richards, Boston, Mass.
Secretary, Carl E. Seabergh, White Plains, N. Y.
Treasurer, George Bickley, Philadelphia, Pa.
Chairman, Burton L. Prince, New Haven, Conn.

Directors: John M. Baer, Hagerstown, Md.; John Balderacchi, Greensboro, N. C.; Allen Black, Newton, N. J.; Frank A. Blum, Sr., Pittsburgh, Pa.; Leon Brooks, Denver, Colo.; Raumond F. Buck, Doylestown, Pa.; Ernest C. Ferguson, Oakland, Calif.; Joseph Gaudio, Camden, N. J.; Arthur Greason, New York, N. Y.; H. A. Greenberg, Atlanta, Ga.; John M. Hall, St. Louis, Mo.; Frank Hicks, Houston, Tex.; A. W. Huss, Milwaukee, Wis.; R. L. Jacobson, Cincinnati, Ohio; H. D. Jester, Sr., Wilmington, Del.; H. C. Johnson, Minneapolis, Minn.; Hugh D. Jones, Portland, Ore.; S. A. Kyte, Detroit, Mich.; Nelson Mason, Tampa, Fla.; Geo. McRoberts, Jersey City, N. J.; T. H. Minary, Louisville, Ky.; W. L. Pavlovski, Chicago, Ill.; Clarence Westcott, Newburgh, N. Y.

William M. Walsh, president, National Wholesale Frozen Food Distributors Association said that with the creation of the new office of executive director of the Association and the appointment of Harry K. Schueffler to head it, he believed they had taken a major step forward. Permanent offices have been opened in New York in the Lincoln Bldg. where Mr. Schueffler's efforts will be directed toward general publicity and affecting more harmonious relations with the various agencies which are so vitally connected with the frozen foods industry. He also announced that next year the distributors' association is going ahead with plans it had made, and postponed this year, for the frozen food exposition in New York City. This will be open to the general public and retailers and is expected to be an industry promotion on a gigantic scale.

Watson Rogers of Washington, D. C., president of the National Food Brokers Association listed a number of industry problems to which attention should be directed. Among these were establishment of a time limit within which shipments should be inspected by buyers and necessary claims filed; arbitration procedure should be set up to handle claims and disputes; cooperation in the prompt shipment of government trades on all frozen foods.

A militant plea for bolstering private enterprise in the United States to counteract Communism and other subversive forces was voiced by Clement D. Johnston of Roanoke, Va., president of the American Warehousemen's Association. Mr. Johnston started on the subject of "Unity, Coordination and Cooperation in the frozen foods industry," but, before he finished, he subordinated the problems of the frozen foods business to the really big problems of this country.

He repeatedly emphasized the opportunities and advantages of free, and private, enterprise in the United States. He pointed out that "it's no mere accident that American products are at once the best and cheapest in the world." Speaking of the subversive elements who may be trying to bore into the country's resources, he said the American people are confronted by a horde of have-nots, both within and without the country, who, under competent though selfish leadership, seem bent on tearing down all that has been accomplished and turning us over to a controlled economy ruled by a group of dictators."

Panel Discussions

The second session Wednesday covered panel discussions of the more important frozen food problems presented by leaders, technical men and members of the industry directed by Lawrence Martin, secretary of the National Association of Frozen Food Packers.

John H. MacVey, counsel of the National Association of Frozen Food Packers, discussed the impact of Federal Food regulations on the frozen food industry. Such regulations, he said, are necessary to keep adulterated and low-grade food off the market. The regulation of frozen foods in this connection has been somewhat confusing because of lack of a thorough understanding of peculiar conditions and particularly improvements are needed along the line of speeding up the procedure.

A recent Food and Drug Administration proposal providing that no frozen fruits may be manufactured with any fruit juice loss would be impossible because frozen fruit cannot be processed without any loss of juice and the effect of such a ruling would prevent the legal sale of any frozen fruit. The request of preservers that frozen fruits be identified by label, stating the percentage components of the ingredients which the preservers say they need to meet their own requirements also provides a stumbling block to smooth relations. Packers do not agree that they need it to know how much is in the container since all frozen fruits are identical in any size container so no difference exists between them.

Another proposed regulation is that manufacturing processes be described in the label. This, he said, could not be used because many manufacturing processes used under present technical knowledge cannot be reasonably predicted by comparison of ingoing and cut-out percentages.

Paul B. Christensen of the Merchants Refrigerating Co., New York City, discussing warehouse distribution problems pointed out that proper refrigerated warehouse facilities is an important factor in the quality of frozen foods. Its application, however, is limited to storage and while it will improve, it will retain quality in foods when stored under proper conditions. Proper conditions require right temperature, relative humidity and strict avoidance of fluctuating temperatures. The type of building to get desired air circulation also is important. He said he didn't want to maintain that warehousing conditions are perfect but the industry is gradually improving these conditions by applying the findings of the Refrigeration Research Foundation. This organization, he said, is of considerable interest to the frozen food industry because approximately one-third of their projects relate directly to frozen foods.

Effective Plant Sanitation

Effective plant sanitation in the food preserving industry stems from the basic design of the buildings and equipment used, according to E. P. Morin, quality control chief of Seabrook Farms Co. The cleaning procedure during production must be carried out rapidly and thoroughly, and therefore only materials which lend themselves to easy cleaning should be used and trouble spots should be eliminated on the drawing board.

Prof. E. H. Wiegand, Oregon State College, talking on research and development pointed out that developments in the food industry have been based on research. Realization on the part of consumers that there is research being done for their benefit by the packers would do more than anything else to build good will and advance the interests of all parts of the industry. This research, he said, can best be done through the cooperation of associations and individual members. Since such research benefits all, it is only fair to ask the entire industry to assume the expense involved. Technological development, he said, was far behind developments in the production, merchandising, and other phases, and much remains yet to be done on improving quality by knowing how best to retail the various food products that are packed by the frozen food method. Research, he said, will answer these and many other problems.

K. G. Dykstra, Birdseye Snider Div., General Foods Corp. talked on manufacturing operations. The quality of frozen foods, he said, depends upon harvesting at the right time, speed in handling and the best possible method of processing. In the first place, the right quality should be selected and the product harvested and shipped at its optimum ripeness. Speed in handling offers much to improve quality and prevents changes in color, texture and flavor. Blanching also is very important because it reduces enzyme activity.

New manufacturing processes are always interesting, he said, and the trade is now watching the processing of quick frozen concentrated orange juice. Another method of processing citrus juice in which the trade is interested is by freezing at low temperature and removing ice crystals.

Frozen Food Industry Reviewed at Press Conference

REGIONAL crop failures no longer materially affect the frozen foods industry because production has been decentralized, according to Fred J. Becker, president of the National Association of Frozen Food Packers. At a press conference preceding the annual convention held in Chicago March 7 to 10, Mr. Becker said that until very recently from 60 to 70 per cent of the major frozen food items, particularly fruits and vegetables, were produced in three states, California, Oregon and Washington. But with growing decentralization the industry is getting onto a scientific production and marketing basis.

Mr. Becker said that stocks of low quality merchandise on the west coast which had plagued the industry since the end of the war have been pretty well off the market for about a year and the industry is now for the first time beginning to settle down into normal conditions. He pointed out that refrigerated space now in home refrigerators and freezer cabinets is far more than sufficient to hold all frozen foods now being produced and this opens up a wide opportunity for the industry. Prices are no higher than a year ago. Present outlook, he said, indicates that there will be a shortage at the end of the season rather than the usual seasonal holdover.

The frozen food industry is making good progress with the chain store, he said. Some of the largest chains are now offering quality frozen foods, and they expect more of them to enter the field.

Amplifying Mr. Becker's comments, Wm. M. Walsh, president of the National Wholesale Frozen Food Distributors said that the big bottleneck in the industry is now, as it has been for several years, a shortage of cabinets in retail stores. While the chain stores are doing an increasingly better job in this respect, the smaller independent food stores are slow to install proper equipment.

Armour and Seabrook Join in Marketing Frozen Poultry

TWO major food companies, Armour & Co., and Seabrook Farms Co. have completed arrangements whereby a complete quick frozen, table-dressed poultry line, packed by Armour, will be marketed through the Seabrook distributive facilities in the New York area. Company officials indicated that the poultry items boxed under a Seabrook Farms-Armour Cloverbloom label will be available to food retailers on or about April 1.

C. F. Seabrook (left), President of Seabrook Farms Co., and F. W. Specht, President of Armour and Company, smile for the camera after signing a contract joining the two companies in a mutual venture to provide top quality eviscerated poultry to the metropolitan New York area. Under the agreement, Armour will procure and process quick-frozen poultry for distribution through the Seabrook Farms organization and its New York distributors.

In making the announcement, a joint statement by executives of both companies said: "This joint venture assures dealers of obtaining the finest quality eviscerated poultry, delivered regularly to their stores under perfect refrigeration conditions. Combining the most attractive features of the two familiar cartons of both organizations, the new package has been designed to create higher consumer appeal."

Frozen Food Yearbook

THE annual yearbook has been issued by National Wholesale Frozen Food Distributors, Inc., which provides a valuable guide and directory of the frozen food industry. Leading packers are represented by space advertisements and significant facts about the frozen food industry have been gathered from many sources.

One interesting feature is a collection of up-to-date statistics showing increased retailer acceptance of frozen foods, historical production charts showing increased production over the last 24 years, frozen fruit and vegetable pack statistics, prices paid growers for representative vegetables, buying habits of American housewives and others. Articles were contributed by representatives of subsidiary industries including warehousing, home freezers and others.

Frozen Seafoods Offer Method of Meeting World Food Problem

PRESERVATION of food through modern refrigeration in "areas of abundance" for distribution in "areas of want" offers a solution to seasonal shortages throughout the world, S. W. Brown, New York, chief engineer of the Marine Department of Carrier Corporation, told members and guests of the Institute of Food Technologists, Western New York Section, assembled at Syracuse University, Syracuse, N. Y. on October 30.

Pointing out that a special committee of the United Nations has been meeting at Stockholm, Sweden, to find ways and means of combatting the world's food problem, Mr. Brown noted that modern refrigeration methods, particularly quick-freezing, has been a vital consideration in the discussion.

"India's old famine menace, the loss of seed between crops because of the devastating heat and humidity, is being solved by the installation of refrigerated warehouses in the cities of Lahore, Delhi and Gurdaspur, the first step of a long range program," Mr. Brown said.

"A second step to increase India's food supply is a program for the quick freezing of fish," he continued, "with the initial installation, which is being built by the government as a pilot plant, to be later turned over to private enterprise. This is being constructed in Bombay.

"Today, practically every ocean-going vessel is equipped with a mechanical refrigeration plant. The refrigerated cargo vessel is an important factor in the alleviation of food shortages through the transportation of perishable foods from areas of abundance to areas of want."

Reviewing the history of mechanical refrigeration aboard ships, Mr. Brown outlined various methods employed. He stated that a program of equipment standardization has been in the process of preparation for the last three years and is now awaiting final approval by the American Society of Refrigerating Engineers.

Asserting that much attention is now being given to the quick-freezing of fish and sea food, Mr. Brown said with present methods of icing only the "top of the catch" is of high enough quality to be sold at a premium. "With quick-freezing at sea properly applied, the entire catch should be of premium quality," he added.

"The Department of the Interior recently announced that a project to freeze fish at sea for later processing on shore is the first item on the technological research program on the Fish and Wild Life Services Branch of the Division of Commercial Fisheries for the fiscal year.

"Preliminary test, using new techniques, have been encouraging. It is proposed that the fish will be quick-frozen in the round aboard the fishing vessel immediately after the catch. Later on shore the fish will be defrosted to cut out fillets, which, will in turn be re-frozen and stored. Valuable by-products, which are now mostly dumped overboard, would be recovered on shore, to produce fish meal, vitamin oils and other pharmaceutical products."

Locker Service by Home Cabinet Owners

A SURVEY by Capper Publications of Kansas City was made recently to determine the number of families using frozen food, the facilities used for storing and the need for small frozen food storage cabinets.

The results showed that 86 percent of those surveyed use frozen foods and that 80 per cent of those using frozen foods rent space in a locker plant, only 8 per cent relying on home freezers. The chief advantages of adequate home storage are saving of time and travel, and classed as secondary advantages were savings of money and work.

Flow of Water in Pipes

(Continued from page 26)

diagrams of these items are shown to indicate their internal construction. Since there is a lack of uniformity, a range of loss coefficient is given. The data for bends, increasers and diffusers are shown in chart form so as to include the full range of the variable dimensions. This data was assembled from a number of sources and represents the latest and most complete compilation.

The Tentative Standard on Pipe Friction contains a brief review of the basis of the tables, and a very complete description of their use. Several illustrative examples are worked out in detail for simple and complex piping arrangements. To supplement the use of the friction tables and charts, the pamphlet contains tables on the viscosity and specific gravity of a wide range of commercial liquids and gases, as well as complete tables of dimensions of standard steel, wrought iron and cast iron pipes. This information, together with supplementary data on the properties of fluids and charts showing the full range of the friction factor, permit the computation of the loss for any liquid or gas in any of the commercial forms of circular pipe.

Copies of this new book may be obtained from the Hydraulic Institute, 90 West St., New York 6, N. Y.

One-Man Ice Plant

(Continued from page 32)

This double-tank arrangement makes 108 tons of ice of a very clear quality. The ice is carried by a conveyor all the way across the storage room and out to the platform, when desired. The brine temperatures are kept at 11 F.

Like the other plants described, this one has 300-lb. 14-gauge ice cans of size 11 by 22 by 51 inches. The old ice-making system at the brewery used 400-lb. cans. The new system was started in the middle of the past summer.

Mathias Gaebler is both brewmaster and chief engineer. Slow speed Corliss-engine-driven compressors, one vertical and two horizontal, carry the refrigerating load for both the ice plant and the brewery. The beer carries the "Old Hoosier" trade-mark.

Warm Weather Slows Down Ice Harvest

THE unseasonal warm weather coupled with a rise in the level of the Grasse river near Massena, N. Y., have played havoc with ice harvesting operations of the Massena Ice Co. Floyd E. Horton, manager of the company, said early in March that work of filling the concern's ice houses is now at a standstill with about one-third of the harvest completed.

Work on the project had to be terminated when warm weather and a rise in the water level occurred, making it impossible for men engaged in the harvest to reach the field. Ice had left the river in the area surrounding the conveyor used to carry ice into the company's ice house. At that time open water existed both above and below the ice field, although the field itself is in good condition according to Mr. Horton.

Delta States Ice Association

THE board of directors of the Delta States Ice Association has chosen the Hotel Buena Vista, Biloxi, Miss., for the 1949 annual convention. It will be held November 28, 29 and 30, 1949.

Philadelphia Section ASRE Plans Twentieth Anniversary Meeting

THE year 1949 marks the twentieth anniversary of the granting of a Section charter to Philadelphia by the American Society of Refrigerating Engineers. Members of the Philadelphia Section were informed at their meeting on February 4, 1949, that this occasion will be appropriately observed at the May meeting. The Anniversary celebration will be held at the Llanerch Country Club just outside the West limits of Philadelphia with an afternoon of sports, a dinner and evening entertainment on Friday, May 13, 1949.

J. G. Doebrich reads paper at meeting of Philadelphia Section A.S.R.E.

Celebration plans include a review of the history of the Philadelphia Section from 1929 to 1949; the records of which have been kept faithfully by its Historical Records Committee. Living past Chairmen of the Philadelphia Section will be honored guests and certificates of appreciation will be presented to those not having received one in the past. A.S.R.E. members of other Sections who may be the vicinity of Philadelphia at that time are cordially invited to help celebrate this momentous occasion.

It was with deep regret that the members of the Philadelphia Section were informed of the death of one of their former members, Lee C. Leslie, in St. Louis, Mo., January 24, 1949. Although Mr. Leslie was a member of the St. Louis Section, most of his activities as a member of A.S.R.E. were performed during his Philadelphia Section membership. He was a faithful and untiring worker in all A.S.R.E. activities.

At the technical session of the February 4 meeting, a scheduled as well as an unscheduled paper was presented. both papers by the same author. In the absence of the author, Albert Hanson, of Drayer Hanson, Inc., Los Angeles, Calif., the papers were presented by Ted McLaughlin of Rasco, Inc., a member of the Philadelphia section, associated with Drayer Hanson, Inc.

The scheduled paper was entitled "Application of Forced Air Coils for Above and Below Freezing Temperatures." The author briefly described the various types of coils used for Forced Air Application and cited numerous high temperature and low temperature applications. The paper stressed the desirability of combining sound engineering with good judgment in making suitable selections for the various applications. The necessity of considering the circulation of large volumes of air over the coil surfaces in an endeavor to obtain a close differential in temperature between the room air and the refrigerant was repeatedly mentioned. Illustrations of bad engineering were given, with recommendations for the proper way that it should be corrected.

The other paper was entitled "Heat Pump, Its Basic Design, Source of Heat and Application." Although this paper was not scheduled, it was received with enthusiasm. It pointed out limiting factors that must be considered in heat pump applications. The paper illustrated the types of control and how these controls are switched from summer to winter conditioning. Various sources of heat for winter conditioning were discussed with a warning that the contractor must thoroughly investigate these sources and be certain that the source of heat is satisfactory.

It was pointed out that where ground is the source of heat, the soil structure will have a definite bearing on the transfer of heat from the soil to the pipe surface and this can vary as much as .2 Btu. heat transfer per square foot of coil surface. The speaker was bombarded with questions and although he had not prepared the paper, he was able to answer most of them satisfactorily.

At the January meeting of the chapter, J. G. Doebrich, sales engineer of the Rochester branch York Corp., presented a talk on maintenance contracts for small, medium and large capacity refrigeration and air conditioning installations. His talk included variations of maintenance coverage.

Chicago Section A S R E

IT IS now possible to put 1,000,000 Btu of energy to work by expending 100,000 Btu. This seeming paradox describes the new system of re-compression evaporation which Joseph A. Cross discussed before 95 members and guests of the Chicago Section, American Society of Refrigerating Engineers meeting February 10.

Mr. Cross explained that the heat pump and/or refrigeration cycle is applied to the Lo-temp Evaporator process, utilizing both the high side and the low side of the cycle. In a typical application orange juice is passed through the tubes of a shell-and-tube heat exchanger while NH_3 in the compressed gaseous state surrounds the tubes. The resulting exchange of heat condenses the NH_3 and vaporizes the volatile part of the orange juice. By means of a vapor separator, the concentrated orange juice is drawn off while the moisture vapor is piped into the shell of the second heat exchanger. Here the liquid NH_3 is allowed to expand within the tubes, drawing its heat from the moisture vapor and is drawn off by the compressor to complete the cycle. Since the exchange of heat in the two shell-and-tube devices is exactly equal, only the motor energy must be removed by a de-superheater which is water-cooled.

The first commercial application of this method has been installed in an orange juice plant at Lake Wales, Fla. while numerous pilot plant operations are being used in many branches of the food processing industry as well as the petroleum refining industry. Experiments are now being conducted with eggs, coffee extracts, pectin solutions, heat sensitive pharmaceuticals and blood serum.

Majonnier Bros. Company for whom Mr. Cross is research director, is actively pioneering all these new fields.

Los Angeles Section A S R E

THE February meeting of the Los Angeles Section, American Society of Refrigerating Engineers, brought another outstanding speaker, Dr. Alexander Goetz, associate professor of the California Institute of Technology. Dr. Goetz gave an illustrated talk on "The Last 100 Degrees on a Low Temperature Scale." This is a subject in which Dr. Goetz is particularly well qualified. He joined California Tech in 1930 and since 1939 has also been serving as a scientific research consultant to the War Department and to industry.

Cruise for Spring Meeting

THE 36th spring meeting of The American Society of Refrigerating Engineers will be held June 5-8 aboard the SS Richelieu on a cruise to Montreal and up the Saguenay River. The usual technical sessions will be held along with entertainment and sightseeing events. Reservations should be made without delay as there is room for only 400 people and many of the staterooms have been reserved.

Bureau of Standards Adopts New International Temperature Scale

ON JANUARY 1, 1949, the National Bureau of Standards began using the definitions of the International Temperature Scale of 1948 both in its own research program and in calibrating instruments for other scientific and industrial purposes. Based on a draft prepared by members of the Bureau staff, the new scale was adopted at Paris by the Ninth General Conference on Weights and Measures in October 1948, and the official text was approved for publication before the end of the year. This is the first revision of the International Temperature Scale since its adoption 21 years ago. The experimental procedures by which the scale is to be realized are substantially unchanged; but certain refinements, based upon experience, have been incorporated to make the scale more uniform and reproducible.

The experimental difficulties inherent in the measurement of temperature on the thermodynamic scale (an ideal scale based on energy changes in a Carnot cycle) led to the establishment in 1927 of the practical scale known as the International Temperature Scale. This scale is based upon six reproducible equilibrium temperatures, or "fixed points," to which numerical values are assigned, and upon specified interpolation formulas relating temperature to the indications of specified standard temperature-measuring instruments. The scale is designed to conform, as nearly as practicable, to the thermodynamic Celsius[1] scale as it is now known. At the present time, however, it is possible to obtain values of temperature on the International Temperature Scale more accurately than on any thermodynamic scale.

Increased Precision Needed

The International Temperature Scale of 1927 proved useful in providing a stable, uniform, and precise basis for obtaining temperatures. However, since the adoption of this scale, the increasing precision attained in temperature measurements had made it apparent that some revision was desirable in order that measurements of physical constants, for example the freezing and boiling points of pure compounds, might be made on a more exactly comparable basis by laboratories in all parts of the world. Because of the present leadership of the United States in the fields of heat and thermometry, the major responsibility for proposing and obtaining agreement on the changes fell to the National Bureau of Standards. After many consultations with scientists and laboratories in this country and abroad, the Bureau prepared a draft which formed the basis of the document finally adopted by the General Conference as the International Temperature Scale of 1948.

The six fixed points of the 1927 scale were the boiling point of oxygen (-182.97C), the freezing and boiling points of water, the boiling point of sulfur (+444.60C) the melting point of silver (+960.5C), and the melting point of gold (+1063C). From -190 to +660C, the measure of temperature was based on the indications of a standard platinum-resistance thermometer used in accordance with specified formulas. From +660 C to the gold point, a platinum-platinum rhodium thermocouple was the reference instrument; and above the gold point, the optical pyrometer has been standard.

The same fixed points, with one slight modification, are specified in the 1948 scale, and the laboratory procedures for obtaining temperatures between fixed points are essentially the same as those previously used. Only two revisions in the definition of the scale result in appreciable changes in the numerical values assigned to measured temperatures. One of these is the change in the value for the silver point from 960.5 to 960.8C, which affects temperatures measured with the standard thermocouple. Thus, in the range between 630 and 1063C, numerical values of temperature are higher than on the 1927 scale, the maximum difference being about 0.4 degree near 800C. The adoption of a new value (1.438 cm-deg) for the constant c_2 in the radiation formulas changes all temperatures above the gold point. In the new scale, Planck's radiation formula is specified instead of Wien's for calculating temperatures above the gold point as observed with an optical pyrometer. Since Planck's law is consistent with the thermodynamic scale even at high temperatures, this change removes the upper limit to the scale formerly imposed by the use of Wien's law.

There are several other important modifications in the scale which cause little or no change in numerical values for temperatures but serve to make the temperatures more definite and reproducible. For example, the standard platinum resistance thermometer is to be used as a reference instrument from the oxygen point to the freezing point of antimony (about 630C), rather than over the range from -190 to +660C. Platinum of higher purity is also specified for the standard resistance thermometer and standard thermocouple, and smaller permissible limits are given for the electromotive force of the standard thermocouple at the gold point.

1. The Ninth General Conference decided to abandon the designation "Centigrade" and use "Celsius" instead.

Pellam Joins Bureau of Standards

THE appointment of Dr. John R. Pellam to the staff of the National Bureau of Standards, has been announced. He will be concerned with research in the Cryogenics Laboratory. Dr. Pellam has conducted studies in ultrasonics and low temperature, including sound diffraction, absorbing materials, ultrasonic velocity and absorption, and liquid helium. In his present research he will continue his investigation of the properties of liquid helium II.

Before his appointment to the National Bureau of Standards, Dr. Pellam was on the staff of the Research Laboratory of Electronics at Massachusetts Institute of Technology. From 1942 to 1945 he was a consultant to the Navy, conducting operations research in both the European and Pacific Theaters of Operations under the Office of Scientific and Research Development. From 1941 to 1942 he was a Research Associate at Harvard University investigating underwater sound, and from 1935 to 1936 he was employed by the Eastman Kodak Company.

Dr. Pellam was born in Rome, N. Y., and received his B.S. and Ph.D. degrees from the Massachusetts Institute of Technology in 1940 and 1947, respectively. In 1947, he was awarded the Presidential Certificate of Merit by the Secretary of the Navy for operations research conducted during the war. He is a member of the American Physical Society and of Sigma Xi.

Armstrong Named Mexican Manager for Illinois Tech.

THE appointment of Walter J. Armstrong as manager of Mexican Operation for the International Division of Armour Research Foundation of Illinois Institute of Technology, has been announced by Dr. Francis W. Godwin, division director, in Mexico City. Dr. Godwin said Armstrong's appointment was brought about by the Foundation's growth in Mexico and by numerous requests for assistance in other parts of the world. The Foundation has been engaged in continually expanding programs of research and development in several Central and South American countries since 1941. Mr. Armstrong has been associated with the Foundation's program in Mexico since 1945 and been a member of the staff since 1941.

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COMING CONVENTIONS

EASTERN STATES ICE ASSOCIATION
March 31-April 1, 1949
Hotel Haddon Hall, Atlantic City, N. J.
Samuel Freer, Secretary-treasurer

VIRGINIA ICE MANUFACTURERS' ASSOCIATION
March 31-April 1, 1949
Haddon Hall, Atlantic City, N. J.
H. H. Snyder, Secretary

INDIANA ASSOCIATION OF ICE INDUSTRIES
April 12-13-14, 1949
French Lick Springs Hotel, French Lick, Ind.
O. P. Fauchier, Secretary

Fires and Accidents

Los Angeles, Calif.—The Royden Ice Co. plant at 1407 Georgia St. suffered severe fire damage to the front portion of the one-story frame building and compressors and other refrigeration machinery were damaged. The fire started when a can of asphaltic paint was ignited by a gas heater. Damage was estimated at $15,000.

Seminole, Okla.—A tile-covered roof over the front of the Seminole Ice Co., 500 North First, which had been weighted down by sleet, collapsed recently. The 10 by 50 ft. structure fell on a parked car in the company drive.

New York, N. Y.—A fire destroyed the interior of the two-story plant of the Blue Ribbon Ice Cream Co. Inc. recently. The plant occupies most of the block bounded by Atlantic, Rochester and Utica Ave. and Pacific St. in the Bedford-Stuyvesant section of Brooklyn.

Niagara Falls, N. Y.—A kerosene heater on the platform of the building of the Cataract Ice Co., 821 Cedar Ave. flared up and ignited the office and roof of the loading platform.

Dover Plains, N. Y.—Damage estimated at approximately $150,000 destroyed the A. W. Waugh ice plant February 21. An overheated muffler on one of three diesel engines started a minor fire about noon. Little damage resulted. The firemen checked the building carefully after extinguishing the fire. Inspection was made two hours later and there was no sign of fire. The fire evidently burned up through cork insulation and sawdust and after smoldering for some time, broke out, according to Mr. Waugh. The building was formerly a cold storage plant, built about 50 years ago.

Sales and Reorganizations

Quitman, Ga. — J. W. Castleberry of Atlanta has purchased the Quitman Ice Co. Extensive repairs are being made.

Bartlesville, Okla.—The Glencliff Co. was purchased recently by the Crystal Ice and Frozen Food Lockers, Inc. of this city. The sale price was undisclosed. Edward C. McClintock is president of the new firm.

Norton, Va.—The Western Ice Service Co. of Kansas City, Mo., has purchased the Old Dominion Ice Corp. from the Kentucky Utilities Co.

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New Incorporations

Shreveport, La.—A charter of incorporation had been granted City Ice Delivery. Authorized capital stock was listed at 3,000 shares of no par value.

Buffalo, N. Y.—A business name has been filed in the Erie County clerk's office for the Mook Ice Co., 419 N. Division St., by Sam F. Loughridge.

Bartlesville, Okla.—Crystal Ice & Frozen Food Lockers, Inc., has been incorporated with a capital stock of $120,000 by Edward C. McClintock, Dewey, president and John M. Holliman, secretary, Bartlesville.

Anderson, S. C.—A charter has been granted to Anderson Ice & Fuel Co., to deal in ice and other products; capital stock $50,000; C. M. Brown, Jr., president.

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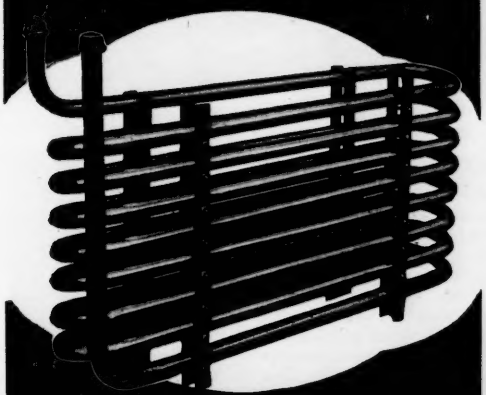

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NEW PLANTS AND IMPROVEMENTS

Information pertaining to proposed new plants, utilizing refrigerating equipment, as well as additions, improvements, and rehabilitation of existing plants. News items of such new plants and additions is invited for publication in this department.

ARKANSAS

Dumas, Ark.—Roy Morley, general manager for the Delta Ice Co. of West Memphis, Ark., has announced plans for a branch plant to be installed here. The new plant will be called Swifty's Ice Co. and will be managed by Mr. and Mrs. Bob Jones. The output will be 15 tons of ice daily. A new building is being constructed.

CALIFORNIA

Oakland, Calif.— W. S. McKinney Ice Service Co. has completed installation of seven new S & S Ice Vending Stations (Model 20). This company is now operating 14 automatic stations inside Oakland. The stations were supplied by S & S Vending Machine Co. of California.

San Francisco, Calif.—Dubuque Packing Co. has purchased the former plant of the Fontana Food Products division of Hunt Foods, Inc. and will rebuild the razed building and construct an additional plant. The total plant investment will approximate $500,000.

San Francisco, Calif.—Omaha Cold Storage Co.'s sales subsidiary, Ocoma Foods Co. is quadrupling its capacity here with a new $150,000 cold storage warehouse at 417 Illinois St. J. L. Gagini, vice-president of Omaha Cold Storage Co., explained that the company's expansion results from increased consumption of Midwestern poultry and eggs and increased acceptance of ready-to-cook poultry in which Omaha Cold Storage pioneered 17 years ago.

COLORADO

Denver, Colo.—The Denargo Market is adding a quarter-million-dollar building program to provide additional storage space, receiving rooms and a new frozen food operation. The new building will be located at the Twenty-ninth St. and Broadway site of the market.

GEORGIA

Folkston, Ga.—A large ice storage plant is to be erected just south of the Kozy Kabin Kamp on the west side of Route 1 by J. B. Hinson. The construction work, which is under direction of the Florida Ice Machine Corp. of Jacksonville, is well under way, and according to company officials will be completed by April 15.

HAWAII

Hilo, Hawaii—Plans for immediate construction of an 18 ton ice and cold storage plant costing $100,000 were announced recently by Richard Nip, Hilo accountant and stockholder in a new corporation being formed to operate the plant. The completion date is scheduled for June 15.

MAINE

Eastport, Me.—Francis J. O'Hara and Sons, Inc. of Portland and Rockland who recently assumed ownership of the Frank H. Neal plant will enlarge the business substantially, including the building of another wharf where filleting of fish will be done, a huge freezer plant will be built and a new ice plant built.

MICHIGAN

Detroit, Mich. — Borin Bros. report additional S & S Sturdy-Built Ice Vending equipment installations are completed and ready for the summer season. Latest equipment to be installed is a Model 16-C Ice Vending Station equipped to dispense 25 lb. pieces of block ice, 10 lb. packages of prepared ice and 25 lb. packages of prepared ice. Equipment was supplied by F. B. Dickinson & Co., Des Moines, Iowa.

NEW YORK

Long Island, N. Y.—Knickerbocker Ice Co. recently completed installation of additional S & S Sturdy-built Automatic Ice Vending equipment.

OBITUARY

Alexander G. Riddell

THE death of Alexander G. Riddell, president of the Liberty Fuel & Ice Co., Portland, Ore., occurred February 14 at Portland General Hospital. He had been ill with a heart ailment for some time, going to the hospital about two weeks before his death. He was 67 years old.

Alexander G. Riddell, Portland, Ore.
(From a 1921 photograph)

Mr. Riddell was born in Scotland in 1882 and in that same year the family moved to Oregon. After graduating from La Creole Academy at Independence, he came to Portland and after a year of business college, he started work for Holmes Ice & Fuel Co. He also attended the University of Oregon Law School then located at Portland and in 1906, a year and a half after being admitted to the bar, he organized the Liberty Fuel and Ice Co. Later he also became president of the Diamond Fuel Co., and, at the time of his death, was a member of the board of directors.

He was an active member of the Northwest Association of Ice Industries and of the National Association of Ice Industries. He served as president of the Northwest Association in 1926 and in succeeding years as a member of the executive committee and Board of Directors. For the National Association he served as president of the Northwest Division from 1930 to 1936 and as a director-at-large from 1938 to 1940.

Mr. Riddell was a charter member of the Arab Patrol of the Shrine, a member of the Al Kader temple and treasurer and member of the board of governors of the Shriners Hospital. He was well known to the children of the hospital in his frequent role as Santa Claus at the annual Christmas party. He was a member of the Arlington Club.

GEORGE DEWEY PECK of Oklahoma City, former member of the State Senate and secretary of the Oklahoma Association of Ice Industries in 1931, died February 28. He was 47 years old. Death was attributed to a heart condition although he had been in ill health for several years. He was a 32nd degree Mason, a member of the Elks, the Woodmen, Odd Fellows and other fraternal orders.

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(Above) Shippers Development Company plant at Salinas, California, where 35 cars can be iced and loaded at one time. Associated Refrigeration Engineers of Los Angeles engineered and constructed the entire plant.

(Right) Part of storage facilities, fed by harvest of 72 blocks in every 25-minute cycle.

Covering 43 acres, the ultra modern Shippers Development Company plant at Salinas, California, will produce six hundred tons of ice per day to ice over seven thousand cars per year! Something over $7,000,000 in vegetables will be processed, packed and shipped annually. Day storage facilities alone will accommodate twelve hundred tons of ice. It is obvious that the extremely high efficiency of PALCO WOOL Insulation, with a thermal conductivity of only .255 Btu. will effect outstanding savings in operating costs. The permanence of flame-proof PALCO WOOL will insure long-term economy, too. Investigate this ideal low-temperature insulation. Write today for the PALCO WOOL COLD STORAGE MANUAL or LOCKER PLANT CONSTRUCTION MANUAL.

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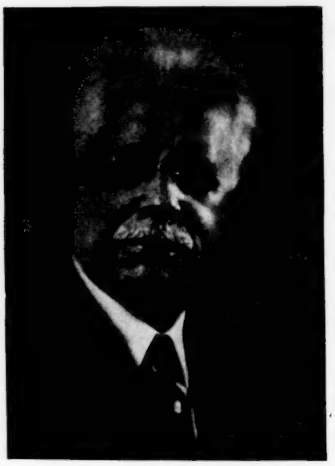
Charles H. Behre, Deceased

THE death of Charles H. Behre, well known pioneer ice executive, occurred at his home in New Orleans, La February 13, 1949. He was 88 years old. Mr. Behre was one of the deans of the ice industry in this country both by reason of his long span of years and his unfailing energy and aggressiveness in this field. He was president of the Pelican Ice and Cold Storage, Inc., leading ice manufacturing and refrigerated warehousing concern in New Orleans.



Chas. H. Behre, New Orleans, La.

Mr. Behre's earliest business years were spent as a pharmacist in Atlanta, Ga. Later he became a sales representative for the York Manufacturing Co. and was instrumental in promoting and establishing many of the ice plants in the southern section of the country. About 1908 he organized the La Grange Ice & Fuel Co., in La Grange, Ga., and served as its president for many years. In 1902 he founded the Pelican Ice Co. and was associated with Fred Meysenburg, who was originally from St. Louis, Mo. In 1904 he organized the Pelican Cold Storage & Warehouse Co. Ltd. He was president of both these organizations which merged in 1945 to form the Pelican Ice & Cold Storage, Inc., which he headed at the time of his death. He moved from Atlanta, Ga. to New Orleans with his family in 1912.

At various times in his long and active business career Mr. Behre served as president of the New Orleans Ice Exchange, president of the Louisiana Ice Manufacturers Association, vice-president of the National Association of Ice Industries, member of the board of directors of the present New Orleans Ice Delivery Corp. and board of directors of the American Institute of Refrigeration.

Mr. Behre was active in civic and welfare groups at all times. He was a long-time member of the New Orleans Association of Commerce and served at one time as chairman of its Manufacturers Committee. He was active in the New Orleans Anti-Tuberculosis Society and at the time of his death was chairman emeritus of the local Salvation Army Advisory Board. He was an accomplished amateur musician and was an active member of the New Orleans Little Theatre.

Mr. Behre is survived by his widow, Mrs. Emilie S. Behre, five children: Miss Edwine Behre of New York City, Dr. Ellinor Behre of Baton Rouge, Theodor S. Behre, who has long been associated with his father in the ice and cold storage business in New Orleans, Mrs. Edna Macgowan of Los Angeles, Calif. and Dr. Charles Behre of Columbia University. He is also survived by seven grandchildren and four great grandchildren.

Theodor S. Behre has assumed the presidency of the Pelican Ice & Cold Storage, Inc. and has as his associates his son, Daniel, and his son-in-law, John F. Little.

Gen. Richard Donovan Deceased

THE death of Maj. Gen. Richard Donovan, vice-president and director of research for the Alford Refrigerated Warehouses, Dallas, Texas, occurred Monday, February 7 in his room at the Fairmont Hotel, San Francisco, where he had gone to attend the annual N A R W convention. Gen. Donovan was wartime commander of the Eighth Service Command. He was retired from the Army in 1947 and since October 15, 1947 had been with the Alford Refrigerated Warehouses.

Maj. Gen. Richard Donovan

He was born in Paducah, Ky., and graduated from West Point in 1908 after which he served in the Coast Artillery. He also had a master of science degree from the Massachusetts Institute of Technology and for a time taught at West Point. During his short connection with the refrigerated warehousing industry he came to be highly regarded and he will be greatly missed.

He leaves his widow who was with him in San Francisco and two children, Richard Jr., and Mrs. Thomas J. Sharpe of Dallas.

M. Errol Gordon, Deceased

THE death of M. Errol Gordon, secretary and treasurer of Frick Company, Waynesboro, Pa., occurred at the Waynesboro Hospital February 14, 1949, after a brief illness. He was 56 years old. He had continued to perform his duties until two weeks prior to his death.

Mr. Gordon was born on a farm two miles southwest of Waynesboro. His father, A. E. Gordon, served for many years as an engineer and demonstrator with Frick Company. He began his work with the Frick Company in May, 1910, as a stenographer. He later became field auditor and in 1926 was elected assistant treasurer. In January 1930, he became treasurer and in addition he served as assistant secretary in 1941 and a year thereafter as secretary.

In his 39 years of service with Frick Company, Mr. Gordon made many friends throughout the country. He was a member of the Lutheran Church, the Waynesboro Country Club, the Eagles, the Elks, the Waynesboro Fish and Game Protective Association and the Isaac Walton League.

JOHN WALLACE REEDER, for many years associated with the Violet Ray Ice Co., Pasadena, Calif., died January 23 after a short illness. Mr. Reeder came to Pasadena from Bellefonte, Pa., following his graduation from Haverford College shortly after the turn of the century and had been with the Violet Ray Ice Co. since that time. He was a member of the Pasadena Rotary Club.

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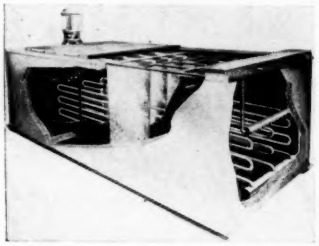
NEW AND IMPROVED EQUIPMENT

MACHINERY-APPLIANCES-PROCESSES

Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

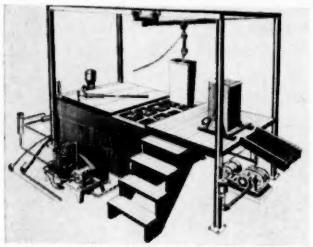
New One-Man Assembled Ice Plants

AN ASSEMBLED ice making plant which will permit operation by one man is announced by the Refrigeration Engineering Corp. The new Junior Ice Plant, as it is called, consists of a completely insulated, welded steel tank mounted on heavy steel skids and equipped with steel raceway coils, 100 lb. cans and brine agitator. Three sizes are available, ranging in capacity from 1000 to 4,600 lbs. However, by connecting two or more of the Junior Ice Plants, production ranging from 4 through 10 tons daily can be obtained.



Cutaway view of one ton junior ice plant showing welded steel construction insulation steel raceway coils brine agitator and cans.

Because of the design and construction of the Junior Ice Plants, they can be used in conjunction with either Freon-12 or Ammonia refrigerating machinery. Further, the plants are available with either electric motor, gasoline or Diesel engine drivers. A complete line of time and labor saving accessories such as, can hoists, can dumpers, can fillers, brine testing kits, ice crushers and ice handling tools have been designed and are available for use with these plants.



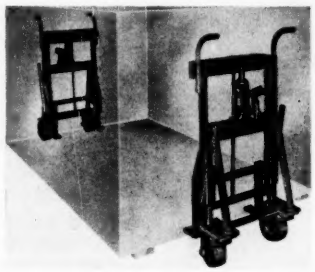
Line drawing showing typical installation of junior ice plant.

One of the interesting features of the new Junior Ice Plant (aside from the fact that the complete ice can field can be harvested at one time, thus permitting one-man operation) is that practically all field erection problems heretofore encountered in construction of commercial block ice plants are eliminated.

It is interesting to note that a study of weights and measurements of the equipment indicates that cubic displacement of the assembled equipment in the new plant compares favorably with the cubic displacement of similar commercial block ice plants heretofore shipped knocked-down.

Rol-A-Lift Designed for Heavy Loads

TWO new Rol-A-Lift models have been announced by the Skarnes Engineering & Supply Co. of Minneapolis. Rol-A-Lifts are designed to handle crated or uncrated materials and products. The manufacturer claims that it will handle loads too heavy or bulky for fork trucks and will move loads into tight places where neither fork trucks or cranes can operate.



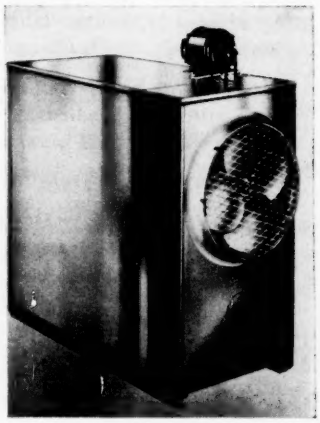
New Rol-A-Lift Truck made by Skarnes Engineering & Supply Co., Minneapolis, Minn.

One of these new units, the Model M-2, has a 2000 lb. capacity and is especially suited for moving long counters, freezer units, storage bins and similar bulky items. The M-2 is built with adjustable forks to accomodate crates of varying width and operates with a mechanical cam lift. The other new model, the M-8, has an 8000 lb. capacity. It is suitable for moving heavy production machinery such as presses, cutters and lathes as well as heavy, bulky crated products, palleted units or similar material.

Rol-A-Lift units are used in pairs and are moved about like hand trucks. To load a crate, one Rol-A-Lift is placed at each end with forks inserted underneath. Each Rol-A-Lift is then jacked up, lifting the crate and putting it on wheels, ready to roll. After the load is moved into place, it is lowered gently to the floor at controlled speed. All models have full-swiveling casters for easy maneuverability. A new, descriptive folder describing the M-2 and M-8 together with 4000 and 6000 capacity models will be sent on request from the Skarnes Engineering & Supply Co.

New Aquatower Cooling Tower

AN AQUATOWER in the 7½ ton bracket has been added to the Aquatower line by The Marley Company, Inc., Kansas City, Kansas., manufacturers of water cooling equipment. Like the other seven Aquatowers, the new model has these desirable features: compactness, quiet operation indoors or out, all-steel construction, bearing housing with grease-packed ball bearings, nail-less removable redwood filling, and many other advancements in cooling tower design. All Aquatowers are carried in stock and are available for immediate shipment. Marley Bulletin AQ-49 gives complete rating data and description.



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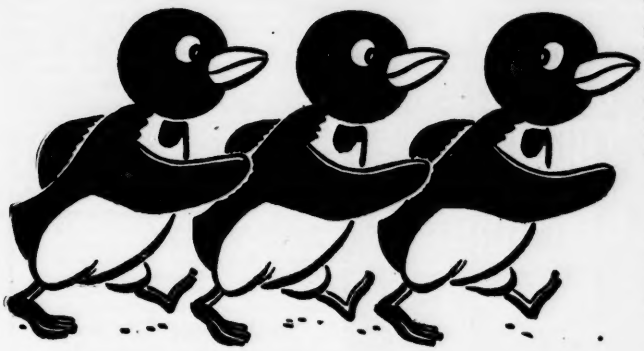

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AIRCRAFT ALUMINUM CONSTRUCTION
Aluminum repels 97% of all radiant heat!

6½" BOARD FORM INSULATION, completely sealed, holds cold in . . . is moisture resistant, won't decay, rot or burn!

SURPLUS POWER REFRIGERATION UNIT
Maintains low temperatures at low cost. Gives trouble-free service. Zero temperature guaranteed at 95° outside!

SELL MORE ICE - Automatically!

POLAR COIN MECHANISM ADDS CHANGE! Takes U.S. Silver coins in varying amounts to add up to a set sale. Rejects slugs and foreign coins. Vending equipment won't overpay in ice . . . returns coins when conveyor belts are empty.

• WRITE FOR FREE CATALOG •

REFRIGERATION ENGINEERING COMPANY
Pioneers in Refrigeration
211 Foshay Tower Minneapolis 2, Minn.

New Icette Unit Makes Ice Cylinders

THE great demand upon ice plants for specialized or cube ice has promoted development by the Pace Brothers, Icette Equipment manufacturers, of Los Angeles, Calif., of a small complete automatic unit, which includes Freon Compressor condensing unit, with insulated brine tank and evaporator unit including Icette producing apparatus. Completely automatic in operation, these units produce 2,000 to 3,000 lbs. Icettes per 24 hours operation. With water of character agreeable to clear ice with air agitation, the product is clear. Colored ice can be produced with this unit.

Automatically the compressor controls brine temperature. Automatic control panel equipped with electric timing devices automatically controls water refilling to the unit, thawing and harvest, as well as conveying product to vault or storage bins if this feature is required.

The compressor is a Freon water cooled condensing unit and includes a small air compressor for provision of air agitation of water in process of freezing, similar to that employed by the raw water air high pressure raw water can ice making systems. The evaporator unit is of Freon low pressure plate type, equipped with temperature control for maintaining proper brine temperatures. The brine tank is the conventional partition and bulkhead type with horizontal agitator V-belted to motor, effecting efficient agitation for maximum heat transfer from freezing ice to evaporator.

The harvest operation is controlled through electric time clock in electric control panel, and is adjustable to change in time settings of the various operations. The complete freezing and harvesting cycle is approximately 55 minutes. The units are supplied in two sizes one of which produces 100 lbs. per cycle, and the other 150 lbs. per cycle. Controlled warm water, is employed for thawing, to permit exact timing of harvest, the unit including for this purpose a small electric water heater. The floor space occupied by either unit, including compressor is approximately 15 ft. long 5 ft. wide and requires a maximum height of 9 ft.

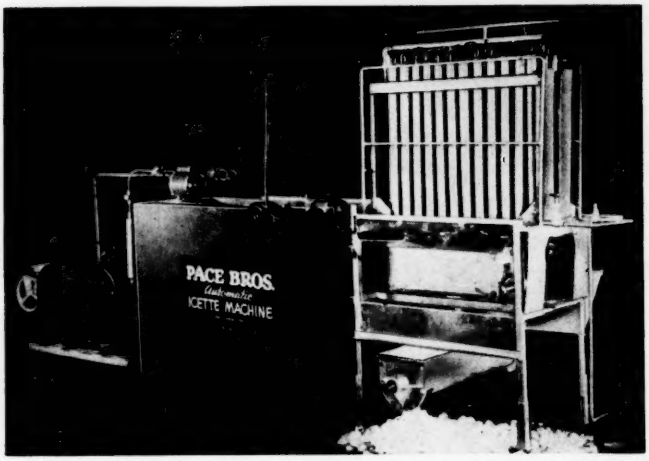


Fig. 1—This view of Pace Bros. automatic icette machine shows cylindrical ice containers leaving brine tank for seating over automatic cutting mechanism which will shortly provide type of ice cubes shown lower right of picture.

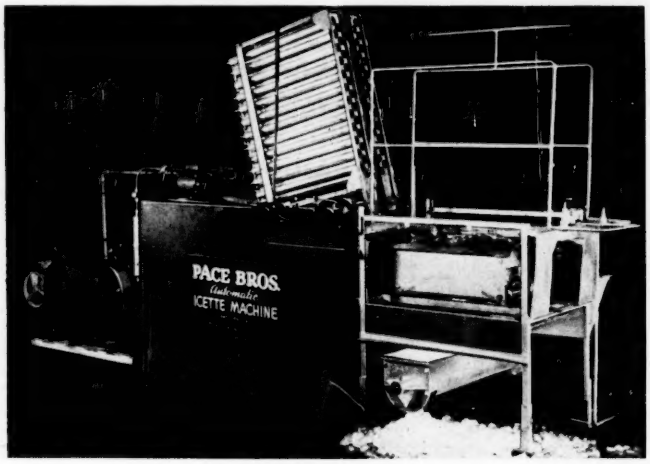
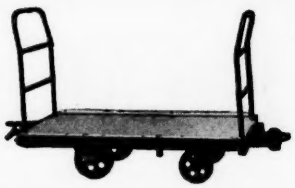


Fig. 2—Cylindrical ice containers in position for automatic cutting of ice "cubes".

Steel Frame Trailers for Moving Materials

ONE piece tee section welded steel frame trailers with automatic couplers are available from the Ohio Galvanizing & Manufacturing Co., Niles, Ohio. These trailers are made with wood tops and are used in warehouses, railroad distribution platforms and practically any place where a complete coupled unit is desired for hauling either a standardized article or various types of packages. Its easily tracking facility lends itself to being adaptable for many materials handling uses. It has a weight capacity of two tons. With two standards it weighs 525 lbs.



New one piece welded steel frame trailer with automatic couplers.

Steel welded trucks also are available for all heavy duty jobs where trucks are needed. They are made in capacities of three to ten tons and with either steel spoke wheels, molded-on rubber tires or pressed-on rubber tires.

The Ohio Galvanizing Co. has been in this business as well as the manufacture of ice cans since 1902. In addition to the above standard equipment, it is prepared to design and manufacture any type or kind of special truck or trailer for special requirements.

Acme

Dry-Ex Water Chillers

For Use in Cooling Water or Brine

ACME DRY-EX WATER CHILLERS are designed for chilling water or brine in large volume. For use with direct expansion ammonia, as well as Freon systems, and other industrial applications, they comply with ASME codes and incorporate many additional features and improvements. Heads are cast steel, shell is seamless steel tubing. Tubes are seamless copper, with steel and alloy tubes available. Refrigerant space is in tubes and heads—water space is in the shell. Frequently savings in initial refrigerant charge will more than offset the additional chiller cost over that of flooded units. For long life, specify ACME. Select the proper type and size from our Catalog No. 631.

ACME PRODUCTS

ACME INDUSTRIES, INC.
Jackson, Michigan
Representatives in Principal Cities

CONTINUOUSLY SERVING THE REFRIGERATION INDUSTRY SINCE 1919

Customary
SPRING PRACTICE

USE

BOWER BRAND
ANHYDROUS AMMONIA

HENRY BOWER CHEMICAL MFG. CO.
29th & Grays Ferry Road
Philadelphia, Pa.

The
BETTER
Refrigeration
BRINE
MEDIUM

SOLVAY
CALCIUM
CHLORIDE

offers these 5
Important Advantages . . .

1. Provides a "long-life" brine . . . lowest cost in long run
2. Allows safe operation at low temperatures . . . permits quicker freezing
3. Makes your equipment last longer
4. Easier operation . . . requires less pumping
5. Reduces possibility of costly shut-downs and repairs

SOLVAY SALES DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

New Dehydrators for Refrigerant Drying

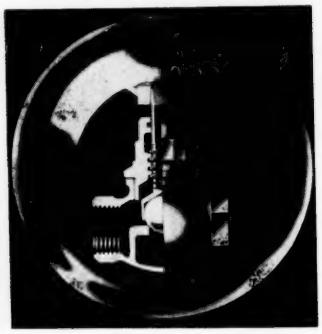
A NEW line of DFN Dehydrators for refrigerant drying, specially designed to use Ducal Drierite, has been developed by the McIntire Connector Co., Newark 5, N. J. The outstanding advantage of the new Dehydrators, according to the manufacturer, is that drying capacity is double that of previous standard for any given size dehydrator. This means twice the protection when used same size as before . . . or that much smaller dehydrators can be used to do an equal job, both resulting in economy and better protection.

Positive, single-pass drying is accomplished in the liquid line. The Du-cal Drierite picks up and holds all moisture on contact. Operation is efficient at refrigerant temperatures up to 150 F. It may be used with all refrigerants. Another unusual step is that accurate ratings of water-adsorbing capacity are given for each size of the new dehydrators.

Many important changes in construction have been made in the progressive filtering and screening areas, to permit free flow, without pressure drop, as well as to provide the most efficient filtering action. Made of all copper and brass construction, the new dehydrators are lacquered blue to distinguish them from other types in the line. Available at present in factory sealed types, sizes from ⅓ hp. to 3 hp., with SAE connections of ¼, ⅜ and ½ in. Larger sizes are soon to be in production. Also available in cartridges for DFN Demountable type dehydrators.

New "Bull Dog" Ball Valve

A NEW type valve has been announced by the Carpenter Manufacturing Corp. The principles involved in this device, according to the manufacturer, mark a departure from former practices. A precision ground stainless steel ball is used to replace the old fashioned discs, poppets etc., effecting a life time seating member with harmless effect upon the seat.



New Bull Dog Ball Valve made by Carpenter Mfg. Corp.

The Ball is spun into its retainer, allowing a slight clearance, which permits the ball to spin when the valve is opened or closed, thus permitting the ball to find a new seat each time. Care is exercised to hold the ball clearance accurately, thus preventing chatter when opening, closing, or throttling.

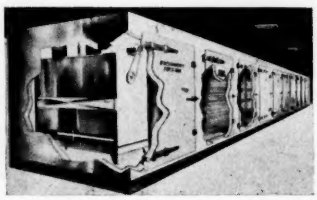
Several years of field service tests it is claimed, have yielded plaudits which could not have been earned by conventional valves. Among the many reports received, one engineer reports that after 52,000 openings and closings under 300 lbs. pressure, the valve showed no wear, and that the ball and seat looked like new.

The Ball Valve is supplied with "O" Ring Seals, for normal service where high temperature is not involved. Conventional steam packing is used in valves installed in steam or other high temperature service. Improved flow characteristics are a natural result of the shape of the ball.

Ball Valves at present are available in ½ in and ¾ in. pipe sizes, in brass. Jobber inquires are invited by The Carpenter Manufacturing Corp., 9523 Detroit Ave., Cleveland 2, Ohio.

New Locker Unit For Groceries and Markets

A NEW frozen food locker unit designed especially for grocery stores and markets, known as the Baker Kold Cell has been announced by the Baker Refrigeration Co., of South Windham, Me., and Omaha, Nebr. These units provide lockers where housewives normally do their food buying, right in the grocery or market.



New Baker Kold Cell Locker Unit

The new lockers consist of standard sections which are built into a single over-all cabinet of varying size depending on available space and number of lockers required. First comes the cooling equipment section containing a floor-type forced draft cooling coil and blower which circulates low-temperature air throughout the unit. Next is the quick-freeze section, equipped with steel trays, for processing foods to be stored. For installations up to 170 lockers, one half of this section is used for freezing, while the other half houses ten storage lockers. On larger installations, the entire section is devoted to freezing.

The third and following sections are all for storage lockers. Each has twenty lockers of 6.2 cu. ft. capacity arranged ten on each side of the unit, and with each group of ten enclosed behind a heavily insulated refrigerator door. Up to sixteen storage sections can be built into one complete unit, giving a total capacity of 320 individual lockers. Height and width are approximately 8 and 6½ feet respectively with the length running from 22 to 75 feet, depending on the number of locker sections desired. Either a Baker Freon or Amonia refrigerating system can be used, with compressor and condensing equipment installed remotely to allow easy access for maintenance.

Activated Carbon Protects Ice Cream

ANOTHER job for activated carbon air purification is protecting the flavor of ice cream. Milk, butter fat, coatings and other ice cream ingredients are very receptive to foreign odors and hence the danger of flavor contamination is something that must be guarded against at all times. The Goldenrod Ice Cream Company of Chicago, one of the country's largest independent producers, takes no chances with the quality of its product. As a final precaution activated carbon air "recovery" units were installed in the plant's cooling room.

Because of the extremely low temperatures maintained, usually 30 F. below zero, the air in the cooling room has a lower moisture and other vapor pressures than the surrounding area. As a result, gases or vapors (odors) in the area from street traffic, industrial plants, garages, etc. will have a tendency to invade the room. Most of the time the room is adequately sealed and the possibility of contamination is present only during loading periods when the conveyor exits are open.

The size of the cooling room is 96,000 cu. ft. and it is served by two air "recovery" units, each with a capacity of 1500 cfm. The total 3000 cfm provides about two air turnovers per hour. The units consist of 60 activated carbon-filled canisters, two 1500 cfm fans, casings and blast deflectors. Plant Superintendent and Production Manager Max F. Halberstadt says that this equipment has enabled them to double the former storage time.

In addition to odor filtration a further precaution is taken by pressurizing the cooling room, the only such ice cream cooling room, it is believed, that is so protected. Damaging odors can be insidious. Often they're in such low concentration that they can't be detected by human beings. The amount of gas-

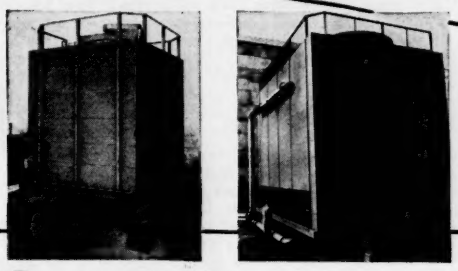
BINKS } Steel-cased Induced Draft Cooling Towers

A size and type for every water-cooling requirement.

Binks Type 2K-S spray filled induced draft cooling towers. Binks 2K-S series cooling towers are ideal for a wide range of commercial water-cooling applications within 150-645 GPM capacity, where use of nozzles is preferred to interior decking for water distribution and break-up. Simple in construction, these units are easy to assemble and erect in the field without skilled help or factory supervision. In 20 standard sizes.

Binks Type 2K-W wood filled steel cased induced draft cooling towers. Series 2K-W cooling towers are widely used for all sorts of industrial applications where high wet bulb design conditions must be satisfied. These towers are all-steel construction, with internal decking and drift eliminators of redwood. Filming action of deck surfaces increases length of time that water is exposed to air, thus creating greater cooling efficiency. Available in 20 standard sizes.

Binks type "K" heavy duty induced draft cooling towers. Widely used for large air conditioning, refrigeration and related installations where abundant circulating water is needed. In "spray filled" or "deck filled" types, depending on service, cooling range, design wet bulb and approach desired. Readily painted to harmonize with most buildings. Tower framing and casing are all-steel, prefabricated for easy assembly.



Send today for technical bulletin describing Binks Induced Draft Cooling Towers.

Contains full information on capacities, sizes, weights, etc., together with tower numbers.

Bulletin Numbers:

36. Type 2K-S Spray Filled Cooling Towers
37. Type 2K-W Wood Filled Cooling Towers
39. Heavy Duty Cooling Towers

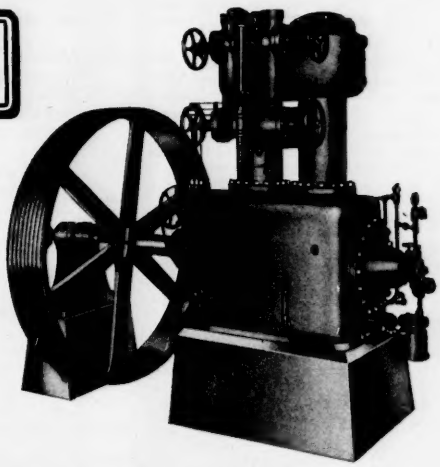
Please state how tower will be used, also capacity required.

THERE'S A BINKS TOWER FOR EVERY COOLING JOB

Binks MANUFACTURING COMPANY

REPRESENTATIVES IN ALL PRINCIPAL CITIES ■ 3130-38 CARROLL AVENUE, CHICAGO, ILL.

Sterling DEPENDABLE REFRIGERATION



The phrase "STERLING DEPENDABLE REFRIGERATION" is more than a slogan—it's a fact.

Built with rugged strength for endurance, with advanced design for efficiency and economy of operation, STERLING Ammonia Compressors are the product of more than fifty years of "know how" in the manufacturing of refrigeration machinery and equipment.

A complete range of sizes insures the correct compressor for each application.

Deliveries are, at present, reasonably current—some models of compressors are available from stock.

For complete information, see your nearest STERLING distributor, or write the factory.

REYNOLDS MANUFACTURING CO.

SPRINGFIELD *"Builders of Fine Refrigeration Equipment"* **MISSOURI**

eous impurities sufficient to contaminate air is so small as to be unbelievable. Less than one part of odorous substances per million parts of air, or one-ten thousandth of one per cent is enough.

W. B. Connor Engineering Corp. of New York manufactures activated carbon air recovery equipment.

Ice Vending In Hawaii

FIRST stages of the effort to solve the ice merchandising and distribution problem of the Hawaiian Islands are now being put to the test in Honolulu with the arrival of two S & S Refrigerated Ice Vending Stations in late February. These units are equipped for sale of 25 lbs. of block ice and 7½ lb. bags of cubes.

low-deck shipment to be carried in the history of the lines.

The fact that S & S venders came completely assembled, ready-to-operate was an important factor in Hawaiian Tuna Packers' choice. Their four ton shipping weight represented an economy according to Frank D. Roos of the Air Conditioning and Refrigeration Department of the Hawaiian Tuna Packers, Ltd.

"We do not feel that the freight cost to Honolulu would be prohibitive for the complete station. In fact, with the high cost of labor, as well as lack of experience, there would not be any advantage for us to use sectional refrigerators," Ross stated.

A sales survey of the productive area of Hawaii had led officials of the HTP to believe that additional stations would be put into use in the near future. One of the greatest difficulties in the island ice picture has been the lack of ice manufacturing facilities. These difficulties were somewhat eased in the latter part of last year with the installation of a 50 ton York ice tank in Honolulu. With the increased capacity, of which a considerable portion is in ice cubes, the aggravating ice shortage has been reported to be somewhat reduced.

Ice manufacturing officials in the Islands are closely watching the results of the S & S equipment. In these complete units, they hope to solve the remaining problem, that of distribution.

Electrical refrigerator interests have been conducting an excellent educational campaign to condition the public to the use of refrigeration. It is the hope of ice maufacturers, however, that increased use of ice will be the beneficial result of their efforts as well.

On the island of Kauai, a small 10-ton ice making plant purchased from the War Assets Administration was put into operation last year. With the exception of intermittent sales of ice to fishing boats, the general public has been purchasing only a comparatively few blocks of ice each day.

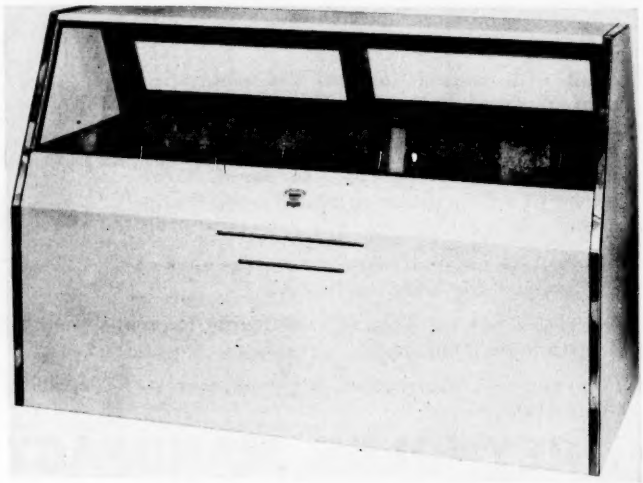
Fig. 1—The truck and trailer enter the docks with two S & S IceVending Stations. They will be taken directly alongside the vessel for direct loading.

Consigned to the Hawaiian Tuna Packers of Honolulu, these complete, ready-to-operate vending stations attracted a great deal of attention in shipment. Matson Steamship Company officials reported that the S & S units were the largest uncrated, be-

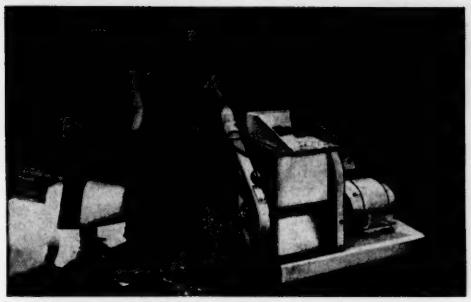
Fig. 2—The four ton ice vending station is slowly lifted aboard the vessel. The hatchtender signals the winch-driver to come up on the offshore fall and ease the heavy lift across the deck.

Fish and Poultry Case Uses Ice

A FISH and poultry case designed for the use of ice is now available from The Marsh Equipment Co,. Burbank, Calif. This case furnished in two sizes, 4 and 6 ft., is built specifically for the display of fish, seafoods, poultry, salads, cold cuts, etc. The products are displayed on a bed of crushed ice in a 6 in. tank encased in fibre glass insulation. In the rear beneath the tank is a roomy dry storage compartment (not refrigerated). The ice capacity of the 4 ft. case is 150 lbs. and of the 6 ft. case 225 lbs. All cases are wired for fluorescent lighting if desired.



New Marsh Fish and Poultry case designed for use of crushed ice, six ft. model.



An ice business builder that benefits everybody

Top-icing produce shipments in transit with snow-ice benefits everybody. It builds new, year-round markets for ice manufacturers and dealers . . . it makes shippers happy because it keeps produce in better condition for higher prices . . . it cuts down labor costs and saves shipping space.

Snow-ice is produced by the Link-Belt Ice Crusher-Slinger, available in a number of sizes and styles. For details ask for Book No. 2261.

LINK-BELT COMPANY
2410 W. 18th St., Chicago 8, Ill.

11,082

LINK-BELT ICE CRUSHER-SLINGER

Newest **PRINCIPLE IN ICE SIZING**

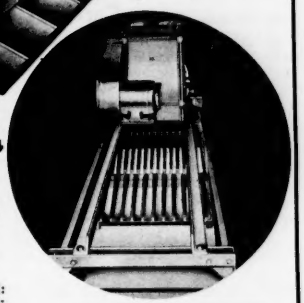
BATEMAN ICE SIZER

Lowest

PRICE ON THE MARKET

Bateman Ice Sizer - Crusher is trouble-free because of its simplicity and the soundness of its time proven design . . . it's fool proof! Sizing is done by a special screen for snow and slides for sizing ice. Snow ice is thrown on a screen, dropping into specially designed tapered slides, falling through openings between the slides, dropping the small, medium and large ice into separate bins.

Makes 4 sizes of ice



NO MAINTENANCE COST: Only moving parts are on 50-lb. adjustable Bateman Crusher.
EASY TO INSTALL: Comes ready to use . .Will work in any vault with 7' head room. Size: 7' long, 5' 9" high, 24" wide.
SANITARY: There are no moving parts in sizer to require greasing.

LOW ECONOMICAL PRICE:

Complete on stand . . . without bins or motor	$454.25
Galvanized ..... add	20.00
Single phase, ¾ h.p. motor	46.60
Three phase, ¾ h.p. motor	42.60

All Inquires Answered Promptly
BATEMAN FOUNDRY & MACHINE CO., INC.
Mineral Wells, Texas

PURITY WITH A PEDIGREE!

The forebears of Mathieson Ammonia are "blue-ribbon" quality...Mathieson sees to that. Mama Hydrogen and Papa Nitrogen are pure-bred—completely free from every trace of contamination.

Yes, Mathieson Ammonia has an enviable pedigree, but wait! . . . what happens before it reaches you? Well, for one thing, it's purged . . . moisture, non-condensable gases and other impurities are eliminated. Cylinders are thoroughly checked. Valves get a special going over. That good pedigree ammonia is available promptly in 100- and 150-lb. cylinders from any of 44 warehouses. Mathieson Chemical Corporation, 60 East 42nd Street, New York 17, N. Y.

Mathieson AMMONIA

Ammonia, Anhydrous & Aqua . . . Caustic Soda
Soda Ash . . . Dry Ice . . . Liquid Carbonic Gas
Chlorine Products . . . Carbonic Gas
HTH Products . . . Carbonic Products . . . Liquid
Sodium Chlorite Products . . . Chlorine Dioxide
Sodium Methylate . . . Sodium Bicarbonate of Soda

MANUFACTURERS' NEWS

Baker Changes Name to Baker Refrigeration Corp.

IN ORDER to better identify the Baker name with its present-day products and broader manufacturing scope, the Baker Board of Directors voted unanimously on February 9 to authorize the change of name from Baker Ice Machine Co., Inc. to Baker Refrigeration Corporation. The change of name becomes effective immediately.

Pictured at left is Albert F. Milton, secretary and treasurer of Baker Refrigeration Corporation handing T. S. Pendergast, general manager, the official papers changing the name of the organization from The Baker Ice Machine Co., Inc. to Baker Refrigeration Corporation.

Albert F. Milton, secretary-treasurer and member of the Board of Directors pointed out that the name Baker first became connected with the ice making industry in 1905 when Joseph Lincoln Baker pioneered in Omaha, the manufacture of ammonia compressors for the artificial ice-making plans. At that day and age the name Baker Ice Machine Co., Inc. identified the organization. Today, however, after 44 years of continuous growth, the name no longer identifies the entire line of products.

Baker for many years has not manufactured exclusively for the ice industry. The present line of refrigeration condensing units includes a complete selection of Freon-type units and compressors ranging from ½ to 60 hp. In the ammonia field Baker offers a line of condensing units and compressors from 2 to 125 hp. Baker manufacturing plants are located at South Windham, Maine and Omaha, Neb.

During the past few months the Company has added several additional products which are marketed through the 74 distributors and dealers in the United States and 47 in foreign countries. These new products include air conditioning units, a warm room locker system, an automatic ice cuber, truck and commercial hold-over plates.

The Headquarter's offices will continue to be located at South Windham, Me. The organization is now headed by T. S. Pendergast who became general manager in October, 1948. Branch offices are operated in San Francisco, Los Angeles, Seattle, Portland, Oregon, Omaha and St. Louis.

Studies of Glass Blocks To be Continued

PLANS for continuing important studies, interrupted by World War II, in bending daylight with glass blocks to provide more usable light in school classrooms, offices, and other workplaces have been announced by Robert W. McKinley of Pittsburgh Corning Corporation Research Laboratory. Addressing the Oregon Section of the Illuminating Engineer Society and Portland area architects at the Public Service Building Auditorium, he highlighted recent developments in daylighting rooms.

An unusual laboratory, the first "lighthouse" was built before the war on a high hill near Pittsburgh. It was used for basic studies of light transmission and insulation characteristics of PC glass block, McKinley stated. Plans for the new postwar lighthouse are being completed. It will be located at the Pittsburgh Corning Port Allegany, Pa., Plant site. Like the pre-war model, it will revolve on a turntable so that PC glass block panels set in the lighthouse's side walls can follow the sun throughout the day or be turned to any point of the compass.

Sun Oil Reports Big Year in '48

THE SUN Oil Co. reports that 1948 was the biggest year of oil operations in its history and at the same time forecast for this year a return of "spirited, wholesome competition" in a market in which supply has caught up with demand. Strong demand last year inereased price levels in the petroleum industry and spurred Sun to new records both in business volume and dollar earnings, the company's Annual Report states.

Marketing conditions changed radically last year as an expanding oil industry gradually overcame supply difficulties, bringing about a "buyer's market" for some petroleum products at the year's end, the report points out.

Sun's record volume of business brought record profits last year. On a gross operating income of $447,309,191 for Sun and its subsidiaries, net earnings totaled $42,853,839. Thus the company earned 9.58 cents on each dollar of sales. Net earnings of $42,853,839 after provision of $7,000,000 accelerated depreciation of facilities constructed or acquired during the post-war period compares with 1947's net earnings of $24,339,913 after provision of $4,800,000 for accelerated depreciation.

The 1948 net earnings were equivalent to $8.61 per share on the 4,928,597 full shares of common stock outstanding at the year-end, or $9.37 per share on the 4,528,532 full shares outstanding on December 31, 1947. Sun retained for use in the business 88 per cent of its net earnings, using this money to step up production of oil, to enlarge the output of its refineries at Marcus Hook, Pa. and Toledo, Ohio, and to expand marketing and transportation facilities.

Factory Representatives for Polar Ice Vending

THE following factory representatives for Polar Ice Vending equipment have been announced by Refrigeration Engineering Co.

John Carson, Lunney-Carson Co., Philadelphia, Pa., covering New York, New Jersey, Pennsylvania, Delaware and Maryland.

E. L. Lowie, E. L. Lowie Co., Gastonia, N. C., covering North Carolina, South Carolina, Mississippi, Alabama, Georgia and Florida.

R. T. King, Louisville, Ky., covering Kentucky, Indiana and Ohio.

J. J. Ballard, Jr., Ballard Sales Co., Fort Worth, Tex., covering New Mexico, Texas, Oklahoma, Arkansas and Louisiana.

J. L. Denneen, Los Angeles, Calif., covering Washington, Oregon, California, Nevada and Arizona.

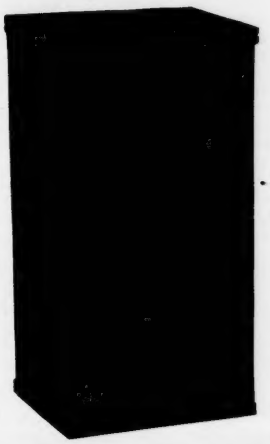
W. C. Rasch Co., Detroit, Mich., covering the state of Michigan.

The remaining territories are being covered by the home office.

Carrier Corp Annual Report

NET profit of Carrier Corporation (air conditioning, refrigeration and industrial heating) for the twelve months ended January 31, 1949 was $2,347,896 as compared with $2,286,810 in the preceding similar period. Completed sales totaled $53,159,620. The comparable figure for the twelve months ended January 31, 1948 was $53,974,774. New orders were booked in the amount of $50,670,071. The total for the preceding twelve months was $45,633,596. On January 31, 1949, Carrier Corporation had a backlog of unfilled orders amounting to $19,131,548 as compared with $22,178,095 a year earlier.

OHIO SPECIAL ICE CANS



Double Riveted Welded
Integral Tube Cans
Can Baskets
Condenser Trough

• • • • • • • • • •

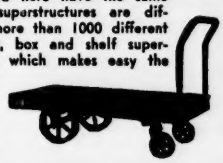
Industrial Trucks
and Trailers

THE OHIO GALVANIZING & MFG. CO.

NILES — Established 1902 — OHIO

THIS THOMAS TRUCK MADE MANY WAYS

All 6 trucks pictured here have the same chassis. Only the superstructures are different. Thomas has more than 1000 different types of stake, rack, box and shelf superstructures cataloged, which makes easy the selection of a "job-suited" truck. Series 3400 truck at right. Hardwood frame, round corners. 10 platform sizes. Write for catalog.



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3192 Mississippi River — Keokuk, Iowa

Tailored to Your Order

COUPON BOOKS

Are the Best Means of Merchandising

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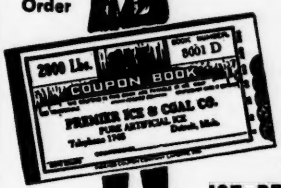

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INDEX COUPON & SUPPLY COMPANY
LA PORTE, INDIANA

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RECO ICE PLANTS

★ We have expanded our manufacturing facilities—completely redesigned our line of Ice Plants so as to produce packaged fast freezing, complete Commercial Block Ice Plants available in a wide range of capacities for prompt shipment.

★ Augmentation of our facilities was necessary because of wide recognition and resultant greatly increased demand for RECO Ice Making and Cold Storage Equipment. Ice Making Equipment is in great demand today —everyone recognizes the function of Ice for the preservation of public health and food stuffs.

★ As a result of our redesign and augmentation of production facilities, we have determined that for Plants using comparable high quality materials and advanced engineering design, you will find no lower prices than those submitted by RECO. That is our policy.

Write for Quotations. Distributorships available to qualified firms.

(REFRIGERATION ENGINEERING CORPORATION)
RECO INTERNATIONAL DIVISION
2020 NAUDAIN STREET, PHILA. 46, PA., U. S. A.

Mathieson Announces Change in Personnel

THREE recent changes in personnel have been announced by Mathieson Chemical Corp., New York City.

Roland F. Boehm, who was district sales manager of the Houston, Tex., office, has been transferred to the ammonia department, with headquarters in the company's New York offices. O. J. Theobald, Jr., formerly district sales manager of the Charlotte, N. C., office, replaces Mr. Boehm as district sales manager of the Houston office. J. F. Carey, formerly a sales representative in the Charlotte territory, has been named district sales manager of the Charlotte office.

Mr. Boehm joined Mathieson in 1946, when his work was connected with the distribution of the output of the Lake Charles ammonia plant. Previously he held positions with the War Production Board, as Assistant Chief of the Nitrogen Unit, and, after a period of service in the Armed Forces, with Nitrogen Products, Inc., in an executive capacity.

Mr. Theobald joined Mathieson in 1932 as a member of the sales staff and has held a number of positions with the company. He is a graduate of Purdue, and a member of several organizations, including the American Chemical Society and the American Association of Textile Chemists and Colorists.

Mr. Carey received his chemical degree from Tufts College and shortly after his graduation in 1937 joined Mathieson where he has been active in sales and sales development. He too is a member of the American Chemical Society and the American Association of Textile Chemists and Colorists.

Vital-Ice Equipment Expands Sales Force

THE Vital-Ice Equipment Co., Cuyahoga Falls Ohio, has expanded its sales force with temporary sales offices at 2670 Overbrook Road. The following district managers have been appointed to assist in the sale of Vital-Ice display cases to the ice manufacturing industry.

T. R. Reuss, 2121 Central Ave., Memphis, Tenn., covering Illinois, Kentucky, Tennessee, Mississippi, Alabama and Arkansas,

Parker Leimbach, 104 Warrenton Road, Baltimore, Md., covering Maryland, Delaware, Virginia and West Virginia,

Phil Mogler, Lester, Iowa, covering Wisconsin, Minnesota, Iowa, Missouri Kansas Nebraska and South Dakota.

Mine Safety Appliances To Build Research Lab.

A MODERN research laboratory, devoted exclusively to the development of safety equipment for mines, all industries, and public service organizations, will be built at Pittsburgh, Pa., by Mine Safety Appliances Co. George H. Deike, president of the company, announced that construction of the four-story building will start imediately, with completion scheduled for September, 1949.

Facilities of the laboratory will be made available to all industry for the investigation of safety equipment problems affecting health and property, Mr. Deike explained. Activities of scientists there will be coordinated with those of the U. S. Bureau of Mines, U. S. Public Health Service, Industrial Hygiene Foundation of Mellon Institute, Harvard School of Public Health, the new School of Public Health at the University of Pittsburgh and fellowships at other leading universities. Research and development efforts will be concentrated on instruments, equipment and other devices to safeguard the health and welfare of workers in all types of industry and, in some instances, the public generally.

The building, to be located one block from the company's Pittsburgh plant, will be dedicated as a memorial to John T. Ryan who, with Mr. Deike, founded Mine Safety Appliances Company 35 years ago.

Bell Aircraft Acquires Baker

ONE hundred per cent of the stock of Baker Refrigeration Corp. (formerly Baker Ice Machine Co., Inc.) of South Windham, Me., and Omaha, Nebr. may be acquired by the Bell Aircraft Corporation of Niagara Falls, N. Y. This announcement was made by Bell Aircraft board of directors and T. S. Pendergast, general manager of Baker. The SEC will be asked to approve a plan through which Bell would acquire the interests in the Baker organization now held by First York Corporation.

Under the plan, Bell would also acquire 9 per cent of the stock of American Wheelabrator and Equipment Corporation of Mishawaka, Ind. held by First York Corporation. In exchange, First York would receive shares of a newly created issue of Bell preferred stock and additional shares of Bell common stock beyond the approximately 35 per cent of Bell common now held by First York.

In commenting on this announcement, Pendergast pointed out that the above concerns are all members of the Equity Group and that the action is only a transfer of stock interest. There will be no changes in Baker's manufacturing policy.

MARTOCELLO ICE PICKS

"Cost You Less To Buy The Best"

Immediate Delivery on Plain Handle Ice Picks

BLADES

of High Carbon Tool Steel, accurately tempered to give you maximum use.

HANDLES

of Sound, Clear Hard Wood with Protective Flexible Lacquer Coating.

FERRULES

of Pressed Steel securely registered on Handle and Plated to Resist Corrosion.

PRICES ON PLAIN AND PRINTED HANDLES HAVE BEEN REDUCED! WRITE TODAY FOR NEW PRICES.

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"Serving the Ice Industry Since 1916" *"There is no Substitute for* MARTOCELLO QUALITY"

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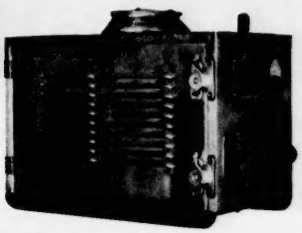

USE GENERAL OZONE EQUIPMENT wherever eggs, vegetables, cheese, fruits, meats and fish are stored . then watch food spoilage go down and profits go up.

Let General Ozone engineers solve your odor and mold problems. General Ozone has a complete line of modern ozonizing equipment plus full service facilities for both old and new types. Write us today for further information.

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Approved by Underwriters' Laboratories, Inc.

Manufacturers of ozone generating equipment for cold-storage • warehouses refrigerated cars • walk-in coolers • air recirculating systems • homes • garages • hospitals

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Continuous Welded Pipe Coils of Any Metal, Size or Design

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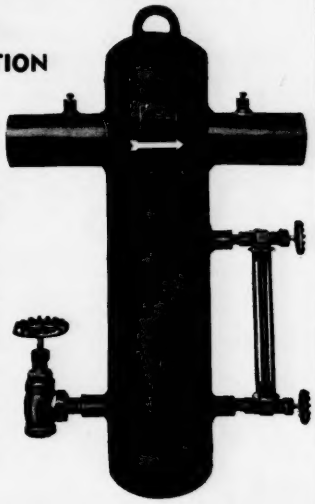
FOR SMALL REFRIGERATION PLANTS



A new 6" Rex Oil Extractor for discharge line of 2" and smaller. Designed to remove lubricating oil vapor from ammonia discharge line.

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Dependable Rotary Positive Blowers

Large stock - New and Re-built
Fast and Dependable Repairs on All Makes. Quick Service—Try Us. 24 Years Experience.

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A NEW METHOD OF AIR CIRCULATION

Provides continuous, gentle air movement in all parts of a room without draft.

FREE

Write for Booklet No. 241 suggesting ways you can prevent food spoilage, dissipate odors, increase capacity and reduce refrigeration costs. It's Free.

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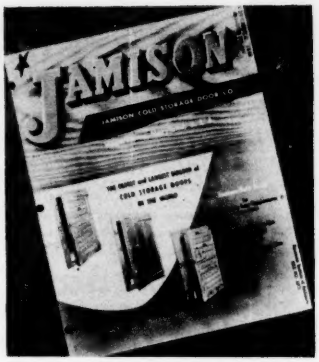
CATALOGS AND BULLETINS

New Cold Storage Door Catalog

TO AID architects and cold storage door users in the selection of the proper type door for their refrigerating requirements, Jamison Cold Storage Door Co., Hagerstown, Md., has prepared a condensed 12-page catalog.

The catalog is divided into three sections, covering: (1) doors for moderately low temperatures, (2) for zero and sub-zero use, and (3) for special cold storage uses. Cuts and diagrams show details of construction. On all standard models, specification tables are given for inside frame door dimensions and size of wall opening required.

The following types of doors are available in the Jamison standard line of cooler and freezer doors: walk-in doors; reach-in doors; double doors; track doors; vestibule doors. Some of the special designs include doors for passing kegs, cans, and crates, ice cream cans, and with built-in chutes.



In addition, a new 4-page folder is available, giving further specifications and details on their Lo-Temp infitting door for low temperature installations. Catalog or folder sent on request to Jamison Cold Storage Door Company, Hagerstown, Maryland.

Trouble Free Service and INCREASED CAPACITY after installing J. H. H. VOSS VALVES

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DESIGNED BY ENGINEERS
MADE BY CRAFTSMEN

in their COMPRESSORS

Replace those inefficient, troublesome valves and you too will get the utmost in economy, efficiency and safety of operation...you will get better results at lower power costs . . . you will get increased capacity . . . with VOSS VALVES.

This letter tells why

The WHITE BELT Dairy
Miami, Florida September 6, 1947

J. H. H. Voss Co., Inc.

In 1934 Voss Valves were installed in our 10 x 10 York ammonia compressor. This installation proved so satisfactory that we have installed Voss Valves in three other machines. To be specific in another 10 x 10, a 9 x 9 and a 7½ x 7½.

We wish to express our appreciation for the trouble free service and increased production that the installation of your valves have brought about.

As we add more machines to our refrigeration equipment they will be equipped with your valves.

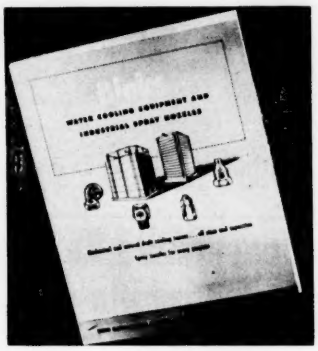
WHITE BELT DAIRY,
John G. DuPuis, Jr., Manager

We will be glad to submit estimates if you will send us the name, bore, stroke and speed of your air, gas or ammonia compressors of any type or size.

J. H. H. VOSS CO., Inc. 785 East 144th Street NEW YORK 54, N. Y.

New Catalog of Water Cooling Equipment

A NEW loose-leaf catalog on water cooling equipment and industrial spray nozzles, as manufactured by the Binks Manufacturing Co., is now available to contractors, engineers, architects, and others interested in



water cooling, refrigeration, air conditioning, and other fields where cooling towers and nozzles are used. The new catalog contains much engineering information and data which make it a valuable reference source in the design of cooling systems or the use of nozzles. Copies of this catalog can be had on request to J. E. Rowe, Binks Manufacturing Co., 3122 Carroll Ave., Chicago 12, Ill.

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Air Pressure Tested COILS

Electrically welded, continuous; Air-Pressure-Tested while submerged in water. Built to your specifications. Send for new Coil Data Book and let us quote.

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Model A7 Produces 100 lbs. every 55 minutes
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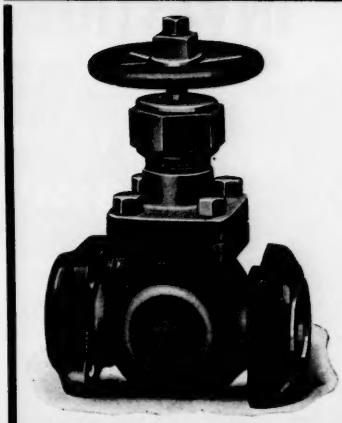
"THE OLDEST NAME IN REFRIGERATION"



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- **AMMONIA VALVES**
  Flanges are screw end in all sizes from ¼" to 8"
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  For ammonia and Freon in all sizes from ¾" to 6"
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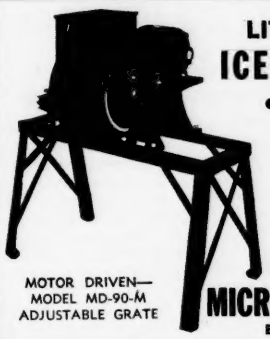

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- SAVE LABOR
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MODEL MD-90-M
ADJUSTABLE GRATE

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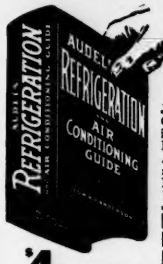

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ANSWERS YOUR QUESTIONS

Just Out! Audels Refrigeration & Air Conditioning Guide for Engineers, Servicemen & Shopmen. Covering Principles, Servicing, Operation & Repairs of Household Special, Commercial & Industrial Units & Air Conditioning. 1280 Pages. All Fully Illustrated and Indexed for Ready Reference. Valuable Facts & Figures including data on Freon, Quick Freezing, Lockers, Water Coolers & Air Conditioning Systems.

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Booklet on Germicidal Sterilamp

A NEW 8-page booklet recently announced by the Westinghouse Electric Corporation contains basic information about various types of Sterilamps (the hot cathode germicidal, the cold cathode germicidal, and the Slimline germicidal), their operation and applications.

The booklet gives a brief summary of the fundamental information regarding ultra-violet light; and technical information concerning the characteristics, output, temperature ratings, metering, and maintenance of the Sterilamp is also covered. Suggestions are offered as to how the Sterilamp can be applied in refrigeration and cold storage plants, in bakeries, in bottling plants (breweries, dairies, and soft drink concerns), by pharmaceutical organizations. Several charts giving additional application data are included.

Although the booklet has been written with the interests of the salesman in mind, there may be some technical men who will find it helpful. Copies may be obtained upon request from the Electronic Tube Sales Dept., Lamp Division, Bloomfield, N. J.

BEFORE YOU INVEST
IN REFRIGERATION EQUIPMENT
INVESTIGATE
Ammonia Compressors
and Boosters
For more than half a century, CP Refrigeration has stood for dependable, economical performance.
CP Engineers, backed by an extensive line of Vertical two-cylinder Compressors, Self-contained Marine Units, and Multi-cylinder Compressors and Boosters, are especially qualified to cooperate in planning refrigeration systems for a wide variety of services. A nation-wide CP organization gives owners of CP Refrigeration Equipment the important advantage of one source of complete supply and service.
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THE CREAMERY PACKAGE MFG. COMPANY, LTD., Avery House, Clerkenwell Green, London, England

Bulletin Describes Vilter Compressors

AN attractive two-color bulletin describing the firm's line of multiple cylinder refrigeration compressors has been published by The Vilter Manufacturing Co., Milwaukee, Wis. Designed for maximum capacity in a minumum of space, these 4, 6 or 8 cylinder compressors fill practically every refrigeration need. Available for Ammonia and Freon operation, the VMC Compressors are compact, properly balanced to reduce vibration to a minimum, and are lighter in weight. In air conditioning particularly, this allows installation practically anywhere without expensive building reinforcement.

Bulletin on Lubrication

AN ELABORATE bulletin on lubrication of refrigeration and air conditioning equipment has been issued by the Sun Oil Co., Philadelphia, Pa. This bulletin, consisting of 52 pages and cover, discusses in detail the types of refrigerating systems, functions of essential parts, characteristics of refrigerants, effect of refrigerants on oils, lubrication recommendations, and applications of refrigeration. With illustration and text it provides an interesting and informative discussion of the subject.

New Catalog on Vending Equipment

An attractive catalog has been issued by Refrigeration Engineering Co, of Minneapolis, Minn., illustrating and describing the line of ice vending equipment and cold storage doors. A number of pictures are shown illustrating exterior and interiors of refrigerated ice stations, refrigeration units, coin mechanism, cake and bag ice venders, plan views of ice stations, blower and plate coils, compressors, cold storage doors for various uses, cabinets for ice cubes and sized ice. Complete price lists are included.

New Bulletin on Refrigeration Condensers

A NEW bulletin covering Vogt refrigeration condensers has been issued by the Henry Vogt Machine Co., Louisville, Ky. It points out the importance of proper selection and correct operation of this equipment and shows types and sizes of condensers which will best meet particular operative conditions. The bulletin is illustrated with pictures, tables and drawings with complete list price of all equipment covered. A copy will be forwarded upon request.

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Quality-Built Heat Transfer Equipment . . . less service . . . longer life . . . greater efficiency. Rempe Products have proved their exceptional value for over 50 years.

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Coils, Bends, Tank and Coil Assemblies for Ice and Refrigeration Plants, Cold Storage Houses, all types of industry—all purposes.

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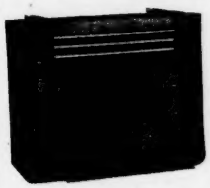

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for low temperature cooling

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Write for bulletin No. 122 or send specifications for quotations.

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In *Freon* compressor and condensing units from 1 to 60 H.P.

In *Ammonia* Heavy Duty Compressor and Condensing Units ranging from 2 to 125 H.P.; Booster Compressors ranging from 2 to 40 H.P.; Heat Exchangers, Valves and Fittings.

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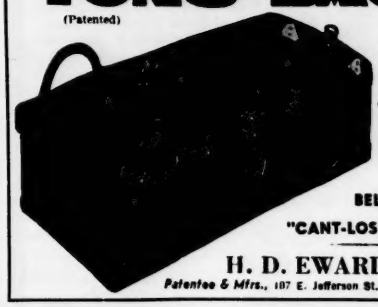

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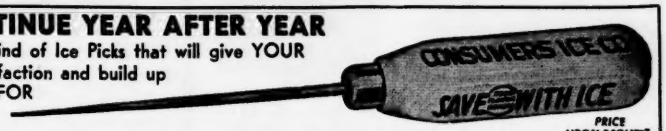
to make the kind of Ice Picks that will give YOUR customers satisfaction and build up GOOD WILL FOR YOU.



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All-Steel GAUGE SETS

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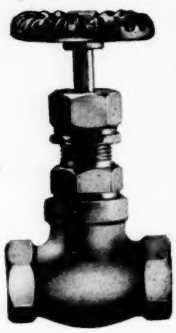

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Highest grade non-porous metal—full size ports—clean cut threads. Back seated stem—Shank design base—perfect alignment. Long life packing ring.

See your jobber or write for prices

CYRUS SHANK CO.
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THE BUYERS

INDEX TO ADVERTISEMENTS OF THESE FIRMS—PAGE 96

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Frick Co., Waynesboro, Pa.
Vogt, Machine Co., Henry, Louisville, Ky.

AIR AGITATING SYSTEMS AND FITTINGS
Martocello & Co., Jos. A., Philadelphia, Pa.
Refrigeration Engineering Corp., Philadelphia, Pa.

AIR CIRCULATORS
Reynolds Electric Co., Chicago, Ill.

AIR COMPRESSORS
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Frick Co., Waynesboro, Pa.
Worthington Pump and Machinery Corp., Harrison, N. J.

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Frick Co., Waynesboro, Pa.
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Niagara Blower Co., New York, N.Y.
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Vilter Manufacturing Co., Milwaukee, Wis.
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Vogt Machine Co., Henry, Louisville, Ky.
Voss, Inc., J. H. H., New York, N. Y.

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Bower Chemical Mfg. Co., Henry, Philadelphia, Pa.
Mathieson Chemical Corp. New York, N. Y.
National Ammonia Div., DuPont, Wilmington, Del.

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Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.

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Creamery Package Mfg. Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc. Chicago, Ill.
Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
Kehoe Machinery Co., Inc., R. P., New York, N. Y.
National Pipe Bending Co., New Haven, Conn.
Pittsburgh Pipe Coil & Bending Co., Pittsburgh, Pa.
Rempe Company, Chicago, Ill.
Reynolds Mfg. Co., Springfield, Mo.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.

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Shank Co., Cyrus, Chicago, Ill.

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Ophuls & Associates, Fred, New York, N. Y.

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Baker Refrigeration Corp. So. Windham, Maine
Electrimatic, Chicago, Ill.
Frick Co., Waynesboro, Pa.
Phillips & Co., H. A., Chicago, Ill.
Rex Engineering & Sales Co. Oklahoma City, Okla.
Vilter Mfg. Co., Milwaukee, Wis.

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Pittsburgh Waterproof Co., Pittsburgh, Pa.
Union Bag & Paper Corp., New York, N. Y.
United Ice Supply Co., Boston, Mass.

BAGS, WATERPROOF PAPER
Union Bag & Paper Co. New York, N. Y.

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Vogt Machine Co., Henry, Louisville, Ky.

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Martocello & Co., Jos. A., Philadelphia, Pa.
Meyer & Sons, Wm. W., Skokie, Ill.
Refrigeration Engineering Corp., Philadelphia, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.

BOILERS
Frick Co., Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

BOILER TUBES
Byers Co., A. M., Pittsburgh, Pa.

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Nickerson & Collins Co., Chicago, Ill.

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Frick Co., Waynesboro, Pa.
Martocello & Co., Jos. A., Philadelphia, Pa.
Refrigeration Engineering Corp., Philadelphia, Pa.
Reynolds Mfg. Co., Springfield, Mo.
Roots-Connersville Blower Corp., Connersville, Ind.
Vogt Machine Co., Henry, Louisville, Ky.

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Kehoe Machinery Co., Inc., R. P., New York, N. Y.
Refrigeration Engineering Corp., Philadelphia, Pa.
Reynolds Mfg. Co., Springfield, Mo.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.

BRINE SPRAY COOLING
Acme Industries, Inc., Jackson, Mich.
Frick Co., Waynesboro, Pa.
Martocello & Co., Jos. A., Philadelphia, Pa.

CALCIUM CHLORIDE
Solvay Sales Div., Allied Chemical & Dye Corp., New York, N. Y.

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Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.
Link-Belt Co., Chicago, Ill.

CHEMICALS
Wright Chemical Corp., Chicago, Ill.

COAL HANDLING MACHINERY
Gifford-Wood Co., Hudson, N. Y.

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Acme Industries, Inc., Jackson, Mich.
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Creamery Package Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Pittsburg Pipe Coil & Bending Co., Pittsburg, Pa.

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Armstrong Cork Co., Lancaster, Pa.
Frick Co., Waynesboro, Pa.
Mundet Cork Corp., Brooklyn, N. Y.
Refrigeration Engineering Corp., Philadelphia, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

COLD STORAGE DOORS
Butcher Boy Cold Storage Door Co., Chicago, Ill.
Jamison Cold Stge. Door Co., Hagerstown, Md.
Refrigeration Engineering Co., Minneapolis, Minn.

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CONDENSERS
Acme Industries, Inc., Jackson, Mich.
Baker Refrigeration Corp. So. Windham, Maine
Creamery Package Mfg. Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc. Chicago, Ill.
Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
Kehoe Machinery Co., Inc., R. P., New York, N. Y.
King-Zeero Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
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Reynolds Mfg. Co., Springfield, Mo.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.

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Opbuls & Associates, Fred, New York, N. Y.

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Lilly Co., The, Memphis, Tenn.
Link-Belt Co., Chicago, Ill.

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Refrigeration Engineering Corp., Philadelphia, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

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Gifford-Wood Co., Hudson, N. Y.
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Ohio Galvanizing & Mfg. Co., Niles, Ohio

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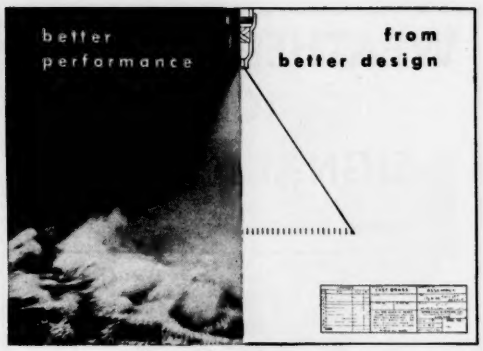

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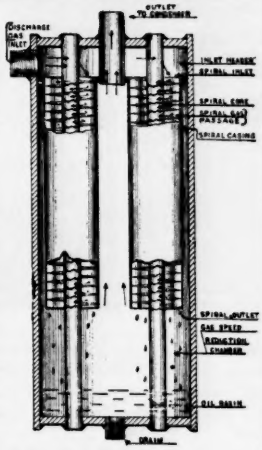

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Niagara Blower Co., New York, N.Y.
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Rempe Company, Chicago, Ill.

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Martocello & Co., Jos. A. Philadelphia, Pa.
Rempe Company, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

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Howe Ice Machine Co., Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.
Worthington Pump and Machinery Corp., Harrison, N. J.

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Thomas Truck and Caster Co., Keokuk, Iowa

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Link-Belt Co., Chicago, Ill.

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Refrigeration Engineering Corp., Philadelphia, Pa.
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Vivian Mfg. Co., St. Louis, Mo.

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Link-Belt Co., Chicago, Ill.
Martocello & Co., Jos. A., Philadelphia, Pa.
Refrigeration Engineering Corp., Philadelphia, Pa.

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Lilly Co., The, Memphis, Tenn.
Link-Belt Co., Chicago, Ill.
Refrigeration Engineering Co., Minneapolis, Minn.
United Ice Supply Co., Boston, Mass.

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Frick Co., Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

ICE CRUSHERS
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Micron, Inc., Bettendorf, Iowa
Refrigeration Engineering Corp., Philadelphia, Pa.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

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Lilly Co., The, Memphis, Tenn.
Pittsburgh Waterproof Co., Pittsburgh, Pa.
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United Ice Supply Co., Boston, Mass.
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Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.
Martocello & Co., Jos. A., Philadelphia, Pa.
Pace Brothers, Los Angeles, Calif.
Refrigeration Engineering Corp., Philadelphia, Pa.
Thermo Cuber Co., Chicago, Ill.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

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Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.
Pace Brothers, Los Angeles, Calif.
Thermo Cuber Co., Chicago, Ill.
United Ice Supply Co., Boston, Mass.

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Gifford-Wood Co., Hudson, N. Y.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
Martocello & Co., Jos. A., Philadelphia, Pa.
Pittsburgh Waterproof Co., Pittsburgh, Pa.
Union Bag & Paper Corp., New York, N. Y.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

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Link-Belt Co., Chicago, Ill.

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United Ice Supply Co., Boston, Mass.

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Creamery Package Mfg. Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc. Chicago, Ill.
Frick Company, Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
Kehoe Machinery Co., Inc., R. P., New York, N. Y.
Martocello & Co., Jos. A., Philadelphia, Pa.
Pace Brothers, Los Angeles, Calif.
Refrigeration Engineering Corp., Philadelphia, Pa.
Reynolds Mfg. Co., Springfield, Mo.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
Worthington Pump and Machinery Corp., Harrison, N. J.

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Vivian Mfg. Co., St. Louis, Mo.

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Martocello & Co., Jos. A., Philadelphia, Pa.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

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Refrigeration Engineering Corp. Philadelphia, Pa.

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Index Coupon & Supply Co., La Porte, Ind.
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Martocello & Co., Jos. A., Philadelphia, Pa.
United Ice Supply Co., Boston, Mass.
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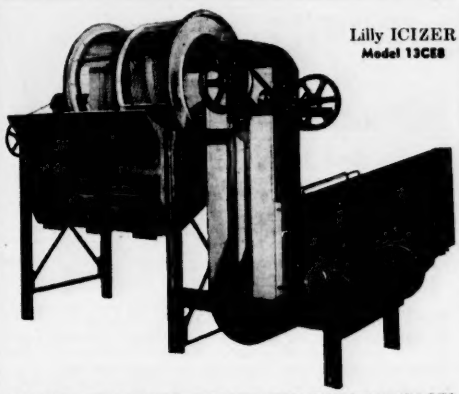

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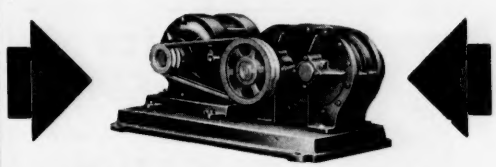

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Texas Co., The, New York, N. Y.

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Sun Oil Co., Philadelphia, Pa.
Texas Co., The, New York, N. Y.

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National Pipe Bending Co., New Haven, Conn.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Pittsburgh Pipe Coil & Bending Co., Pittsburgh, Pa.
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Philadelphia Pipe Bending Co., Philadelphia, Pa.
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Rempe Company, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

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Byers Co., A. M., Pittsburgh, Pa.
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Roots-Connersville Blower Corp., Connersville, Ind.

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Worthington Pump and Machinery Corp., Harrison, N. J.

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Roots-Connersville Blower Corp., Connersville, Ind.

PUMPS, AMMONIA AND BRINE
Baker Refrigeration Corp., So. Windham, Maine
Deming Co., The, Salem, O.
Frick Company, Waynesboro, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.
Vogt Machine Co., Henry, Louisville, Ky.

PUMPS, DEEP WELL
Deming Co., The, Salem, O.
Layne & Bowler, Inc., Memphis, Tenn.
Worthington Pump and Machinery Corp., Harrison, N. J.

PUMPS, ROTARY
Aurora Pump Company, Aurora, Ill.
Deming Co., The, Salem, O.
Martocello & Co., Jos. A., Philadelphia, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.
Worthington Pump and Machinery Corp., Harrison, N. J.

PURGERS
Frick Company, Waynesboro, Pa.
Rex Engineering & Sales Co., Oklahoma City, Okla.

RAW WATER FREEZING SYSTEMS
F.-P. System—Frick Co., Waynesboro, Pa.
Martocello & Co., Jos. A., Philadelphia, Pa.
Refrigeration Engineering Corp., Philadelphia, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

REBOILERS
Frick Company, Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

REFRIGERATED ICE STATIONS
Refrigeration Engineering Co., Minneapolis, Minn.

REFRIGERATING AND ICE MAKING MACHINERY
(See Ice Making and Refrigerating Machinery)

REFRIGERATOR FANS
Reynolds Electric Co., Chicago, Ill.

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Lilly Co., The, Memphis, Tenn.
Perfection Ice Scoring Machine Co., Fort Worth, Texas
United Ice Supply Co., Boston, Mass.

SECOND HAND MACHINERY AND SUPPLIES
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United Ice Supply Co., Boston, Mass.

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Acme Industries, Inc., Jackson, Mich.
Frick Company, Waynesboro, Pa.
King-Zeere Company, Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
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Spraying Systems Co., Chicago, Ill.

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STORAGE HEATERS
National Pipe Bending Co., New Haven, Conn.

STRAINERS
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The Moto-Truc Co., Cleveland, Ohio

UNIT COOLERS
Acme Industries, Inc., Jackson, Mich.
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Layne & Bowler, Inc., Memphis, Tenn.

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Rempe Company, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

WELL SCREENS
Layne & Bowler, Inc., Memphis, Tenn.

WROUGHT IRON PIPE
Byers Co., A. M., Pittsburgh, Pa.

A Vest Pocket Library
For the Engineer
REFRIGERATION MEMORANDA
(12th edition)
By JOHN LEVEY
A handy book containing a surprising amount of useful data required in everyday practice.
FLEXIBLE LEATHER—ONE DOLLAR
Nickerson & Collins Co., Publishers, 435 Waller Ave., Chicago

WANTED and FOR SALE ADVERTISEMENTS

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for the purchase and sale of USED equipment, existing and used plants, and surplus material. Rates: $3.50 for 50 words or less; 60c for each additional 10 words or fraction thereof; 75c per line for bold face headings; $9.00 per inch for ads all set in bold face type or listing items on separate lines.

POSITIONS AND HELP WANTED

POSITION WANTED—As chief engineer of ice and refrigeration. Applicant has thirty years practical experience with technical training, familiar with all standard equipment including steam, electric and Diesel power, low temperature, quick freezing, etc. Will go anywhere. Address Box JA-16, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

WAREHOUSE EXECUTIVE—employed in permanent position as warehouse manager, desires to relocate, preferably in midwest or central states. Approximately twenty years in refrigerated and general merchandise warehousing, with general business training and background. Progressive, responsible, good habits and health, and excellent references. Address Box AP-20, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

REFRIGERATION ENGINEER

Opening in Cleveland Office of nationally known engineering firm for engineer heavily experienced in design of refrigeration for process plants of all types.

Permanent position offering excellent salary for qualified applicant. Please submit complete resume stating experience, education, date available and salary required. All replies kept confidential.

THE H. K. FERGUSON COMPANY
FERGUSON BUILDING
CLEVELAND 14, OHIO

ICE PLANTS—*Wanted and For Sale*

FOR SALE—One 10 ton ice plant complete. Diesel or gas driven. Price $10,000.00. Terms if desired. Address Box AP-4, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—Cold Storage-Ice Plant & Building Supply business. Could not be replaced for $200,000. Must sacrifice for $60,000 including two fine homes. Illness forces sale. Glick & Rostan, Clayton, New Jersey.

FOR SALE—Complete 160 ton electric driven, raw water ice plant, in two units; in constant operation and in perfect condition. Address Box AP-5, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—15 ton ice making plant and business. York equipment, electric or Diesel. Cement block building, storage, crane, softener, air agitator, crusher, scales, office equipment, good trucks, miscellaneous equipment, 21 cash & carry houses; serves 2 cities. Reasonable; terms. Selling—poor health. L. D. Decker, Realtor, Alma, Michigan.

AIR CONDITIONING—REFRIGERATION BUSINESS

Successful, well established corporation, representing one of the oldest nationally known manufacturers of refrigerating, ice making and air conditioning equipment. Shop equipped for pipe bending, buft welding and light manufacturing. Located in Central West city of 250,000. Great opportunity for the right party with capital. Address Box AP-16, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44.

FOR SALE—25 ton modern up to date plant in good resort and manufacturing town, 850 ton storage. 3 distributing and several cash and carry stations. Selling output PLUS. No competition. Plant needs enlarging. Good coal business. Private siding with Godfrey conveyor and elevated track for gravity loading. Ample storage space. Family business for seventy-five years. Owner wishes to retire. Terms can be arranged. Fred P. Biederwolf, Monticello, Indiana.

FOR SALE—the following ice properties all located in good thriving communities in state of Oklahoma:
Two ice plants of 260 tons, in large city, perfect condition and enjoying maximum sales, large fleet of ice trucks. 40 ton ice plant in live town; best of condition, living quarters, doing good business. 30 ton ice plant combined with a 957 locker plant and feeder plant of 515 lockers, complete processing, rendering, sales and storage. 25 ton ice plant combined with a 615 locker plant and feeder plant of 715 lockers, complete processing, rendering, sales and storage. Write C. H. Walbert, Ferguson Investment Co., 310 N.W. 2nd St., Oklahoma City, Okla.

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WANTED and FOR SALE ADVERTISEMENTS

USED MACHINERY—*Wanted and For Sale*

FOR SALE—1 York 6"x6" compressor, V-belt and 20 h.p., 3/60/220V motor 15' double pipe condenser, gauges and valves. Consolidated Products Co. Inc., 13-21 Park Row, New York 7, N. Y.

FOR SALE—One 1948 model, size 1, Model D Link Belt ice slinger with 10' hose and swivel nozzle. Never used. Sanitary Dairy Company, Box 125, Muskegon, Mich.

FOR SALE—Heavy duty ice crusher with 2 h.p., 3 ph. 220/440, 1200 r.p.m. motor, also 100 lb. and 50 lb. Thermo Cubers to be used with hot water or steam. Will sacrifice. H. Lang & Son, 5210 Wentworth Ave., Chicago 9, Ill.

FOR SALE

One National Superior Diesel engine, direct connected to generator. Engine Model A-6 85 h.p., 1200 r.p.m. G.E. generator capacity 50 KW, 3 ph. 60 cycle 440 volt 1200 r.p.m. United Ice Supply Co., 55 Beverly St,. Boston 14, Mass.

FOR SALE—Immediate delivery. York 11x13 two cylinder compressor with force feed oiling, with or without 75 h.p., 3 phase, 60 cycle, 220 volt, 500 r.p.m. motor with compensator and belt. Have put in automatic machines. Biederwolf Coal & Ice Co., Monticello, Indiana.

WANTED—In the market for any good used refrigerating and ice making equipment you may have for sale. Address Box DC-19, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—One 50 h.p. CE 220 v., 695 r.p.m. motor. Also one 4" Connersville rotary blower; one 3" Connersville rotary blower. Also 3, 4 and 7 h.p. 3 ph. motors. Will sell extremely cheap. Clements Fuel Co., Red Oak, Iowa.

FOR SALE—Forged brass fittings, ½" IPS x ⅝ flare No. 445 KEROTEST angle valves 95 cents each. ½" IPS x ¾ flare 90° elbows 25 cents each. FOB Chicago. C. B. Goodman & Co., 6459 S. Morgan St., Chicago, Ill.

FOR SALE—850 ice cans, 300# cap., 11x22x46", riveted, no leakers, weight 77 lbs.; most cans only few years old, excellent condition, $2.75 each. Also available ammonia and Freon compressors, ice flakers, air conditioning units. Barliant & Company, 7070 N. Clark St., Chicago, Ill.

FOR SALE—Good used machinery. Diesel engines 80 h.p., 140 h.p., 180 h.p., generators, cooling tower, blower, crane, hoists, pumps, motors 1 h.p. to 30 h.p., 3x3 Erwin Frick self-contained unit. Write for detailed list of equipment and prices. David J. Copeland, P.O. Box 575, Richmond, Kentucky.

FOR SALE—9x9, 7½x7½, 6x6, 5x5, 4x4 Yorks, splash lubrication. 4x4 and 3x3 self-contained units. One 8 ton, one 12 ton shell and tube condensers. One 16" x 7 ft. and one 16" x 10 ft. receivers. Two 10 h.p. Freon condensing units with 8 Acme blowers. Write E. Niebling, 1318 St. Clair Ave., Mt. Healthy, Cincinnati 31, Ohio.

FOR SALE—2 vertical agitators, 2 h.p. 850 r.p.m., 220, 3 phase; one 30' 2 can pull Sheppard 1000# traveling crane, 120' 6" channel rails; 1 new 2 can can-filler; 240 yoke type drop tubes; 1 storage vertical type scoring machine, hydraulic lift, chain driven saws, 11½"x22½"x40" blocks, $300 as is; 1 blower, 40 ton cap. V belts, 5 h.p., 1250 r.p.m., 220 3 phase; 430 ice cans, size 111⅝"x22¼"x44½" welded, 14 gal., used one season; 4000 ft. 1¼"x21' coils. Address P.O. Box 53, Cincinnati 53, Ohio.

FOR SALE—Ammonia compressors, brand new, leading make. 2 cylinder, vertical, single acting machines complete with V belt drive, gauges, compressor oil, foundation bolts, wrenches. 8"x8"—$2,695.00. 9"x9"—$3,260.00. 10"x10"—$4,110.00. FOB Philadelphia. Immediate delivery subject to prior sale. Export Packaging Co., Division Quaker Storage Co., 330 N. American St., Philadelphia 23, Penna. Telephone Lombard 3-6370.

FOR SALE—1 each self-contained units, 4x4 Creamery Package, 4½x5 Baker, 5x5 York twin cylinders. One 9x9 York; one 6x6 Frick; 150 ton DeLaVergne with Skinner Uniflow steam engine; 1-ton York flake ice unit. 10x10 Frick crank shafts and pistons, flywheels. 1 each 150 and 180 h.p. Fairbanks-Morse Diesel engines. 1 each 40 and 60 KVA generators. 12,000 gal. fuel tank. Freezer doors, weld ends, return bends, coils, fittings, motors, 90 K.W. Erie-Ball generator unit. Parke Pettegrew & Son Company, 370 W. Broad St., Columbus 8, Ohio.

FOR SALE—USED ICE PLANTS & EQUIPMENT

1—35 ton York ice plant Diesel driven 2 can pull.
1—30 ton York ice plant electric driven 4 can pull.
1—25 ton York ice plant Diesel driven 2 can pull.
1—20 ton York ice plant Diesel driven 2 can pull.
1—10 ton York ice plant electric driven.

COMPRESSORS

1—16x18 York direct connected to 375 h.p. synchronous motor.
1—11x13 York direct connected to synchronous motor F.F.L.
3—10x10 Yorks 250 r.p.m. F.F. lubrication.
1—10x10 Frick direct connected to synchronous motor F.F.L.
2—8x8 Yorks Y-15 185 r.p.m.
2—7½x7½ Yorks Y-15 185 r.p.m.
1—7x7 Frick F.F. lubrication 360 r.p.m.
2—6x6 Yorks F.F. lubrication 360 r.p.m.
3—5x5 York self-contained units, removable cylinder.
3x3 or 4x4 York or Frick self-contained units.
1—40 h.p. Diesel.

Vertical, horizontal condensers. Brine coolers of all sizes. Brine pumps, valves, fittings, electric motors, air blowers and miscellaneous equipment. All equipment rebuilt and guaranteed. Send us your requirements.

B & E REFRIGERATING COMPANY
2 Orange St., Newark 2, N. J.
Phones: Mitchell 3-7790 3-7791 Cable Address "BERECO"

FOR SALE—USED ICE PLANTS & EQUIPMENT

1—20 ton York ice plant Diesel driven, herringbone coils, 2 can pull.
1—30 ton York ice plant, electric driven, herringbone coils, late type.
1—50 ton York ice plant, electric driven, herringbone coils, late type.
1—10x10 York ammonia compressor high speed.
1—6½x6½ two cylinder York high speed ammonia compressor.
1—6x6 two cylinder Frick ammonia compressor, medium speed.
2—6x6 two cylinder late model high speed York compressors.
1—6x6 two cylinder Voss high speed ammonia compressor.
1—5x5 two cylinder York high speed ammonia compressor.
2—4x4 two cylinder York high speed ammonia compressors.
1—3x3 two cylinder Frick unit, high speed.
1—3x3 one cylinder York unit, high speed.
York shell and tube condenser 28" dia. x 16'L., 51—2" tubes.
1—25" dia. x 10'0" long 5 pass enclosed type ammonia condenser.
3—16" dia. x 10'0" long 6 pass enclosed type ammonia condenser.
2—Perfection ice scoring machines 300 lb. blocks.
500—11"x22"x48" ice cans.

All makes and types recording thermometers, shell and tube double pipe condensers (send us your requirements). Brine coolers, double pipe 2" and 2" horizontal brine coolers, submerged shell and tube type. 1½" and 2" ammonia coils, approximately 10,000'. Electric motors, starters and panel boards, all sizes; ice cans, agitators, cranes, pumps, low pressure blowers, valves and fittings. Send us your requirements on any equipment you may need.

ENTERPRISE EQUIPMENT CORPORATION
Phone: Yonkers 8-8118-9 77 Alexander St., Yonkers, N. Y.

LIQUIDATING
Large Ice Plant

3 Ingersoll-Rand compressors, 50, 90 and 100 tons, direct connected to synchronous motors. 1 York 6½x6½ high speed compressor. 1 York 6½x6½ slow speed compressor. 500 ice cans, 300-lb. Large quantity of ammonia pipe with return bends. Electric cranes, pumps, valves, fittings, and high pressure boilers.

H. LOEB & SON
4643 Lancaster Ave. Philadelphia 31, Penna.

EQUIPMENT FOR SALE

1—10x10 YORK HIGH SPEED LATE TYPE AMMONIA COMPRESSOR, FORCED FEED LUBRICATION WITH 54"-13 GROOVE FLY-WHEEL.
1—SET OF 13 "V" BELTS & 1—19"-13 GROOVE MOTOR PULLEY
4—SHELL & TUBE CONDENSERS, MULTIPLE TYPE WITH 42—1¼" SEAMLESS TUBES EACH 16"x16'6".
1—24"x16'6" BRINE COOLER 52—2" SEAMLESS TUBES—452 SQ. FT.
1—33"x16'6" BRINE COOLER 121—2" SEAMLESS TUBES—1012 SQ. FT.
ASSORTED SIZES AMMONIA RECEIVERS AND ICE CANS.
2—3x3 YORK UNITS COMPLETE.
1—4x4 YORK UNITS COMPLETE.
1—5x5 YORK UNITS COMPLETE.
1—5x5 YORK AMMONIA COMPRESSOR.
1—7½ H.P. FREON UNIT COMPLETE.
1—5-TON SHELL & TUBE FREON CONDENSER—BRASS SHELL, BRONZE HEADS COPPER NICKEL TUBES—29 SQ. FT. CAPACITY.
1—FREON SHELL & TUBE CONDENSER—144⅝" ADMIRALTY TUBES, 18 GAUGE. LGTH. OVERALL 8'7"—12" STEEL SHELL—4 PASSES GOOD FOR 20 TO 25 TONS REFRIGERATION.

LARGE ASSORTMENT OF AMMONIA VALVES & FITTINGS

JOHNSON PRODUCTS CO.
394 Johnson Ave., Brooklyn 6, N. Y.
Tel: Hyacinth 7-0140

USED ICE MACHINES AND EQUIPMENT

All Used Equipment Is Reconditioned in Our Modern Machine Shop

THIS IS ONLY A PARTIAL LIST—WRITE ABOUT ANY REQUIREMENTS WHICH YOU HAVE WE ARE BUYING ADDITIONAL EQUIPMENT ALL OF THE TIME.

Compressors with or without motors	Item No.
1—5x5 York, 200 RPM	16
6—6x6 Yorks, 200 RPM	20
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1—7½x7½ York, 225 RPM	50
1—7½x7½ York, 200 RPM	51
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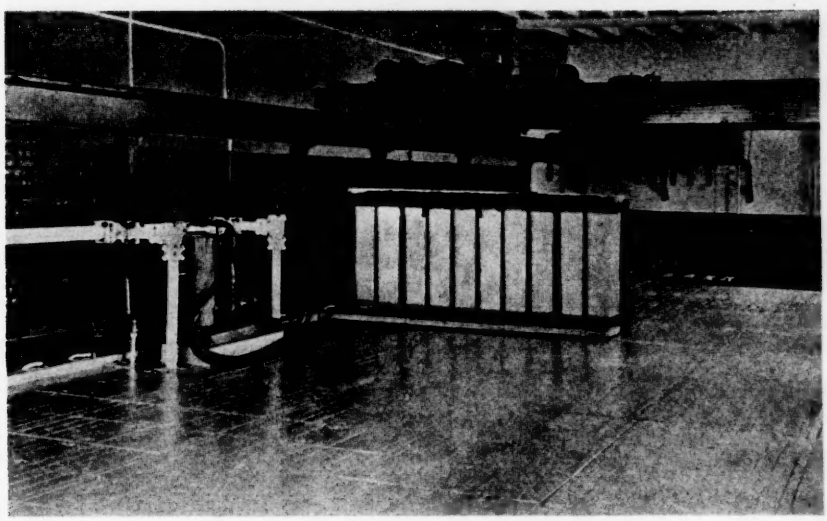
1—10x10 De La Vergne, 360 RPM, forced feed lub.	73
1—10x10 De La Vergne, 300 RPM, forced feed lub.	76
1—10x10 York, direct connected to a 90 HP synchronous motor, complete with Exciter, and Starting Controls.	78
1—10x10 York, 257 RPM, forced feed lub.	80
1—10x10 Carbondale, 100 HP synch. motor, 350 RPM.	81
3—10x10 York's, 225 RPM, semi-forced feed lub.	82
1—11x13 York, 164 RPM, forced feed lub.	90
1—17x18 Frick, direct conn. 300 HP synch. motor.	91

50 TON SECOND HAND YORK ICE MAKING PLANT

10 Can Grid System



Major Component Parts---Listed

1—10x10 medium speed York, running at 240 RPM—with 100 HP slip ring motor, reconditioned—3/50-60/220-440
1—9x9 200 RPM York, with 50 HP reconditioned motor—3/50-60/220-440
1—100 ton shell & tube condenser, retubed and tested—vertical
1—York trunk coil—for tank
1—Oil separator and receiver
600—11"x22"x50" ice cans—arranged in 10 can grids. Cans to be refinished in zinc.
1—Brand new ice tank
1—10 can dip tank
2—3 HP vertical agitators—brand new
1—Automatic 10 can filler
1—2½ ton Sheppard Niles crane—for 10 cans at one time
1—Complete high pressure aerating system
1—Pennsylvania air compressor—with 20 HP motor—3/50-60/200-440

All necessary pipes, valves, and fittings are included with this plant, to make necessary connections from tank, to compressors, condenser, receiver, etc. etc.

Robert P. Kehoe Machinery Company, Inc.

REFRIGERATION EQUIPMENT

1 EAST 42nd STREET, Corn Exchange Bank Building
NEW YORK 17, N. Y.

PHONE: VAnderbilt 6-0881-2-3
CABLE ADDRESS: Kehoeinc

"Butcher Boy"
Since 1885

FIRST *in Construction*
FIRST *in Hardware*
FIRST *in Appearance*

Time tested heavy-duty hardware applications, prime insulation, 100% Douglas Fir construction is a resultant product equalled by none — Butcher Boy. Write for Free Bulletins today.

BUTCHER BOY COLD STORAGE DOOR CO.
170 N. SANGAMON ST., CHICAGO 7, U. S. A.

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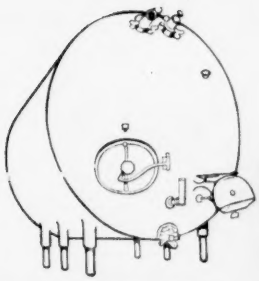
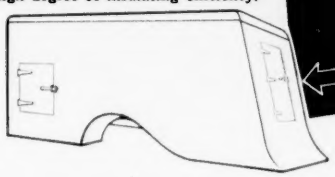
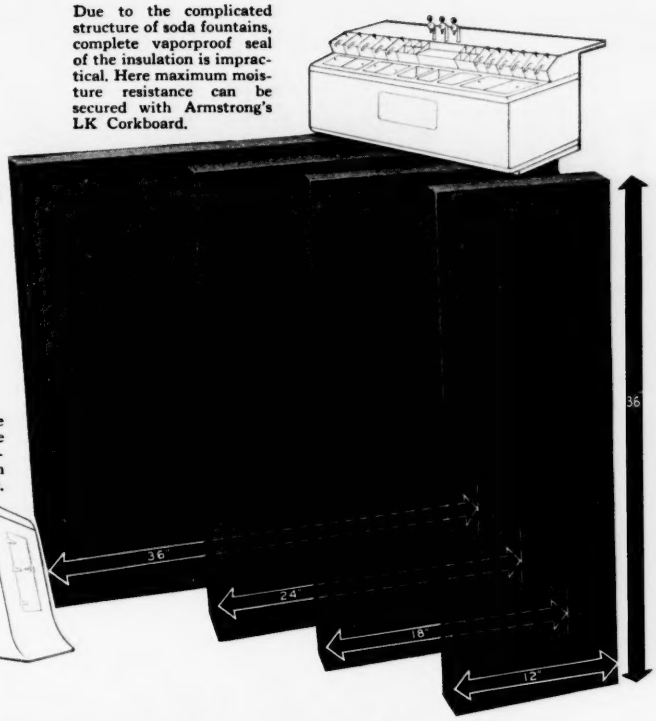


The entire weight of the tank and its contents is supported by the insulation. In these tanks, and wherever load-bearing is a vital part of insulation's job, Armstrong's LK Corkboard is ideal because of its strength.

Refrigerated trucks which cannot be spared from service to dry out the insulation use Armstrong's LK Corkboard to resist moisture and maintain a high degree of insulating efficiency.



Due to the complicated structure of soda fountains, complete vaporproof seal of the insulation is impractical. Here maximum moisture resistance can be secured with Armstrong's LK Corkboard.



Where Armstrong's LK Corkboard Improves Equipment Design

No one type of insulating material is ideal for all refrigerated equipment. In hermetically sealed cabinets one insulation may be best, while in unsealed equipment another does a more efficient job. Many times, a combination of insulating materials will improve design and performance.

Armstrong's LK Corkboard, for example, is not widely used in hermetically sealed equipment because its high natural moisture resistance is not needed there. But there are many other places where LK Corkboard is the most practical insulating material available.

In equipment where a perfect seal cannot be obtained, manufacturers rely on the moisture resistance of cork to keep their cabinets operating efficiently through the years. In bottoms of cabinets, truck floors, and between the outer and inner shells of low-temperature tanks, the load-bearing qualities of corkboard simplify design. In addition to being highly moisture resistant and structurally strong, Armstrong's LK Corkboard is light in weight, easy to handle and fabricate, thermally efficient, and free from objectionable odors.

One of the great advantages of working with Armstrong engineers is the fact that Armstrong sells all major types of equipment insulation—Fiberglas*, Temlok®, and LK® Corkboard. Each of these has a well-defined area of greatest usefulness in refrigerated equipment design.

For complete information and samples, write today to Armstrong Cork Company, Building Materials Div., 4504 Queen Street, Lancaster, Pa.

*® OCFCORP.

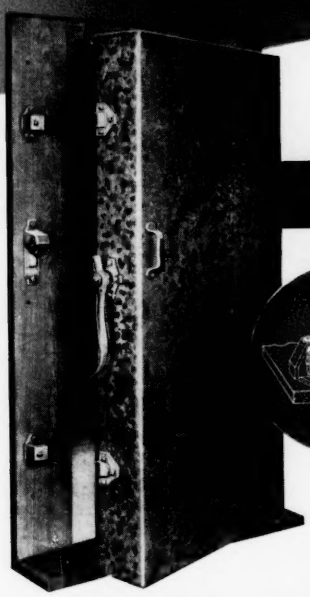
ARMSTRONG'S EQUIPMENT INSULATION

LK CORKBOARD • FIBERGLAS • TEMLOK

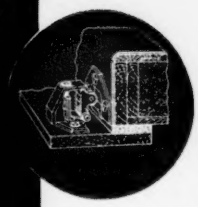
JAMISON-BUILT DOORS

For Use in Zero° F. and Below

TO MEET YOUR SPECIFICATIONS



SUPER FREEZER DOOR



Time Proven Overlap Type

The Super Freezer Door made industrial use of sub-zero temperatures practical. Overlap type of construction permits insulation to any desired thickness. The sealing and insulation efficiency of its 4" wide by ⅝" thick, resilient, moisture impervious gasket is exceptional. The unusually strong hardware of special design, supplied as standard equipment on the Super Freezer Door, is largely responsible for its outstanding performance.

Hinges are: Jamison Adjustable Spring Hinges (Pat. No. 1987512). Fastener: Jamison 031 (single point) Roller Fastener (Pat. No. 2083458).

For only slight additional cost Jamison E-Z-Open (Two-Point) Fastener as illustrated (Pat. No. 2147794) will be furnished. Warm side (Front or Back) of Super Freezer Door is covered with No. 20 gauge galvanized steel forming effective vapor barrier and eliminates possible deterioration due to moisture precipitation.

LO-TEMP DOOR

Infitting Type for Low Temperature Use

A single cellular rubber gasket encased in a moisture impervious skin provides the perfect plug-plus-surface seal. Uniform gasket compression is assured by Jamison E-Z-Open (Two-Point) Fastener (Pat. No. 2147794) in combination with Jamison "Adjustoflex" Hinges, (Pat. No. 2208310). To eliminate possible deterioration due to moisture precipitation the top of door is equipped with a metal cap—front, edges and casing are covered with No. 26 gauge galvanized steel sheet. The Lo-Temp Door satisfies the demand for a door of the infitting type for use in temperatures as low as minus twenty (—20°) Fahr.

JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

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